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JUNE 27, 1955

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NEWS DIGEST



MCDONNELL F-101 VOODOO takes off with three external fuel tanks during simulated "heavy-weight-condition" flight tests. Location of fuel tanks on the longrange Air Force fighter's fuselage was dictated by availability of the Voodoo's thin sweep wings to support the tanks. Propulsion on the ends of fuel tanks may be drop valves. Also note unusual data on F-100's in the "wing tail" elections.

Domestic

Finn & Whitney Aircraft is modifying a Douglas C-124 to take the T-57 engines out in the tail as a flying test bed for four flight tests of the new, split-compressor engine. The T-57 is planned to power the Douglas C-132, 50-ton-payload transport, in new trials. In the test stand but has not yet undergone the required 150-hour static-type test.

The Ford Motor Co. has new contracts to build 75 more C-130 transport aircraft at Dearborn, Mich., for Air Material Command. The contracts, with a total value of \$195,372,897, call for production of 765 powerplants. Three versions are included: J57-35W, 23 and J57W.

Pearlfield Engine & Airplane Corp.'s Aircraft Division received a USAF contract for 75 more C-123B's. The award increases to nearly 240 the number of assault transports scheduled for production at Pearlfield's Hagerstown, Md., plant. Air Force may accept an additional 100 aircraft. The C-123 costs (June 27). The plane will be used by USAF's first assault assault transport unit, the 109th Troop Carrier Group, to be activated next month at Altus AFB, Okla.

Penn American World Airways ordered Model 80V-10 C-based airborne radio from Radio Corporation of America for installation on PWA's entire fleet of DC-6s and DC-7s. Value of the contract is \$1,674,556 for the current fiscal period. Contract

Northwest Orient Airlines is testing Boeing X-based refueling radar in regular passenger flights on a Boeing Stratocruiser. Refueling unit cost approximately \$46,000, including maintenance, a week's test equipment. If adopted by NWA's fleet, the price will be about \$14,000 per plane plus \$6,000 for each installation.

Convair-Fairchild was awarded a \$10-million-dollar Air Force contract to convert 56 Air Force C-54s to an aircraft configuration. Conversion to SC-54 calls for larger fuel tanks, navigation and search search devices, blade removal and rescue equipment. Each plane is scheduled for delivery next fall.

Tankers jets will begin on Boeing Airplane Co.'s Model 707 jet tankers-transport prototype this summer. A South Korean flight of eight refueling equipment has started on the jet and is expected to take several weeks.

Keller Metal Products, Inc., will build additional B-57 wings for Glenn L. Martin Co. and an additional 518 aircraft under contract. The second contract for production of B-57 wings at Keller's Bristol, Pa., plant through July 1958.

Financial

Northern Aircraft, Inc., reported net income of \$3,995,362 for the nine months ended Aug. 30, a nearly four-fold increase over \$1,074,556 for the same fiscal period last year. Construc-

tion sales and other income totaled \$214,917,365, compared with \$199,645,069 last year. Bidding Aug. 30, \$366 million, compared with \$384 million Jan. 21 and \$359 million a year ago.

Ryan Aeroplane Co.'s net earnings during the first half of fiscal 1957 decreased \$796,596 to \$1,059,088 for the comparable six-months period last year. Net sales and other income were \$10,444,135, compared with \$12,540,735. Bidding Aug. 30 dropped to \$12.6 million from \$19 million Jan. 31.

International

South Korean Air Force received four North American F-86 Sabres from USAF last week. The Republic's first U.S. fighter aircraft. At least three squadrons are expected to be based during the next year. Deliveries increased South Korea's military assault unit to 346. In North Korea, unconfirmed reports claimed the Communists now have 231 MiG-15s.

Pacific Western Airlines took a 16-month option to buy Queen Charlotte Airline, a single 707 after years of tough competition between the two real British Columbia carriers. An announcement of the proposed merger came last week. QCA President A. J. Schlesky reported earlier, PWA operations (AW June 6, p. 7). Purchasing price was understood to be well over \$1 million.



Speed for Supremacy

The immediate challenge . . . facing business leaders in every field . . . is the urgent need for expansion and modernization to maintain facilities that will be large enough and strong enough for survival in the race for industrial supremacy.

Yesterday's facilities . . . yesterday's methods of operation are outdated unless they are adapted to the challenge of today's business competition.

In the race to explore new markets with new products and new services, business faces a line of action

extending hundreds or thousands of miles from the home office Division planes, distant developments, far-flung interests of every sort . . . all demand the attention of executives for on-the-spot decisions.

Beechcrafts have helped thousands of expanding businesses meet the challenge of competition and of growth. Cruising at 200 miles per hour, with a range up to 1100 miles, the Beechcraft Twin-Bonanza flies faster and flies farther than any other plane in the simple class. Thousands of business-owned Twin-Bonanzas prove — The World Is Small! When You Fly A BEECHCRAFT.



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Washington Roundup

\$83 Million for Airports?

There is a good chance Congress will pass legislation before adjourning regarding \$63 million in cash and surface funds for federal and for airport construction awards for the next four years—\$50 million for congressional projects and \$3 million for territorial projects. If the President doesn't veto the measure this would give Civil Aeronautics Administration authority to enter contracts for \$83 million in airport aid in fiscal 1956. The House and Senate have already approved a \$20 million appropriation for the year—almost double the Administration's request of \$11 million.

The Senate Commerce Committee has already approved the \$83 million infrastructure report, referred by Sen. Mike Monrue (D-Okl.), and Senate approval is expected this week. A congressional measure has been introduced in the House by Rep. Otto H. Ernst, chairman of the Committee on Appropriations—Aeronautics.

Under these measures, the Appropriations committee would be obliged to appropriate funds "as if" CAA had enough contracts up to \$63 million annually. Under the 1946 Airport Act, CAA has had to obtain appropriations "before" it could make contracts.

ATA Self-Enforcement

Some of the scheduled airlines are skeptical about the plan for setting up an enforcement office in the Air Transport Association to police their own ranks. The complaint is that they will be placed in "double jeopardy," because they are already subject to enforcement from the Civil Aeronautics Board's Office of Compliance.

However, ATA's board of directors approved "in principle" the formation of an enforcement office and voted to put into effect Jan. 1, 1956. The Board accepted the recommendation of the industry's Air Traffic Conference that an enforcement section under a director be established within ATA. The enforcement director and selection of a director, who will live each time for infractions, will be worked out prior to the next ATA directors meeting in mid December.

New Aircraft Restrictions

Because of the red and yellowish-pink publicity that follows an aircraft crash, Navy has again tightened restrictions on public demonstration of aircraft still under development.

The new Bureau of Aeronautics statement states that planes cannot be flown for either their experimental and developmental purposes until safety, its components and the pilot have 50 hours of flight time. Operating hours and missions also must not exceed those authorized by BAAZ.

No Aircraft Show "Booms"

Air Force is expected to protest that Defense Department already has banned some houses and passenger equipment at 1955 National Aircraft Show. That year's Latin Day at the Philadelphia International Airport also will be held with improved insurance coverage, following last year's major damage caused to Airway's display of excess explosives. Residents near the Dulles Airport who find planes have been at Washington recently pre-

pare for settlement and received support from Defense Department aviators, who called the new management to take action.

Army Dissatisfaction

Further manifestations of Army dissatisfaction with Air Force handling of its contract funds is a difference between Army and its contractors' contract to cease to fight.

Army is dissatisfied that Navy was chosen to handle Air research and development funds allocated to a new pre-qualifying competition. Proposals have been boiled down to three companies—General, North American and Hiller—who are expected to get contracts for design studies. Aircraft will be small, for observation purposes.

Meanwhile, several Army aviators told Senate Appropriations Committee they place high hope in the Bell XV-3 and the McDonnell XV-1. Dick Lovett is McDonnell's XVII, a short-range, high lift helicopter powered by two jets.

New Washington Airport

Secretary of Commerce Lester Woods is leaving it up to local residents in Maryland, Virginia, and the District of Columbia to take the initiative on erection of a new airport to ease the increasing traffic congestion at Washington National Airport.

"We have not as yet received any definite indications of active local interest," Woods said in a letter to Chairman Warren Magnuson of the Senate Commerce Committee.

He added: "We shall be pleased to work closely with the local governments in the development of an additional facility, if they indicate an interest and a willingness to participate in such development."

Local opposition killed off the original project to construct a new airport at Burke, Va.

Cargo Plane Leasing

Prime term and conditions under which the Navy will lease modern cargo aircraft to commercial operators and were particularly the monthly rental rate, as expected to further reduce the number of potential applicants.

These rules were first thawed following the Air Conditioning Committee's approval of the Navy program subject to numerous restrictions (AW, June 13, P. 151).

Two aircraft now available on leasing Navy cargo rates—less than eight DC-6As will be available, one Lockheed and Flying Tiger Line but both have expensive洞s that the price may be set too high. Lockheed has a three-month experimental loan of one plane at a monthly rental of \$22,000, and on costs were increased more than 50% is costing the Navy's experiment for a 3,400-hour overhaul.

Other potential lessees include American Airlines, United Air Lines and Seaboard & Western. All qualify under AGC's stiff rules of eligibility. Interested carriers, however, will be asked to review or restate their applications for cargo aircraft with Navy, which at one time had a total of 15 companies making more than 45 airplanes.

—Washington staff

AF to Speed F-101, F-104 Production

Symington scores first victory over Eisenhower as Senate approves additional Marine Corps funds.

By Katherine Johnson

Washington, D. C.—Air Force has decided to accelerate production of two of its new supersonic fighters—the long-range McDonnell F-101 and the light-weight Lockheed F-104. The fighters will probably begin additional production funds next year.

The fighter decision was the second developed to follow from Air Force's series of air production programs undertaken as a result of decisions of Senator John Warner, chairman of Aviation Week (AW, May 25, p. 12). A 35% increase of B-57 bomber production was announced previously, and an additional \$205 million suggested to accomplish this (AW June 15, p. 17).

Other air project Defense Senators Charles W. Tobin will go along with the USAF decision as accelerating fighter output, as well as a request for older aircraft production funds.

Secretary of Air Force Harold Talbott disclosed the fighter decisions in a letter to Sen. Dennis Chavez (D-N. Mex.), chairman of the Senate Appropriations Subcommittee on the Armed Services and ex-wife public damage Senate debate on the \$51 billion defense budget for Fiscal 1956. Talbott said that he would also urge Congress of an recommendation USAF might make to Warner as the next funds for additional funds.

In the past, the procedure has been for the various Senate committees to approach Congress through the Secretary of Defense.

Will Admin. Congress

Draft stated:

"We have not completed our review of all the elements of the program discussed from the appropriation, aircraft and related procurement. Therefore, it is not possible at this time to determine the extent to which additional funds may be needed to finance the program in Fiscal 1956. We are sure, however, that all or a substantial part of the funds necessary to accelerate the fighter programs can be achieved by appropriate adjustments in other areas financed by this appropriation. If additional funds are needed, to properly support the increase in the production

in the Senate is divided: AFM, \$847 billion; Navy, \$91 billion; Army, \$73 billion.

The House is expected to accept most Senate changes.

* The \$86 million added for aircraft procurement. The inclusion of the \$119 billion which the House cut from the Administration's original request and the \$105 million additional requested by the House is expected to bring the total to approximately \$1.2 billion production. The House cut was made because it developed that USAF's new-overs of modified B-57s would be longer than anticipated when the procurement cut, \$100 million, was calculated.

"The production of our current supersonic fighters and fighter-bomber, the F-101, is at a standstill. The production of all-weather fighters, the F-102, is proceeding satisfactorily, but further acceleration of this does not appear feasible."

Talbott said that it is, however, both feasible and practical to step up production on two new supersonic fighters, the F-101 and the F-104, eight times more rapidly than currently contemplated. But these advanced aircraft are ready for volume production.

Victory Over Administration

The two highlights of Senate debate on the Fiscal 1956 defense budget, as an \$85 to \$100 increase.

* Air Force was directed to obligate and expand its funds for research and guided missile production "as quickly as possible" by an amendment offered by Sen. Joseph O'Mahoney (Wyo.) and recommended approved. USAF had a \$57 million obligated production for Fiscal 1955; the amendment would add \$100 million on hand May 1 and two months before the close of Fiscal 1956 (see p. 25).

The O'Mahoney amendment read: "It is the sense of the Congress that the funds . . . for research and related procurement shall be obligated and expended as quickly as possible consistent with proven technological developments to the end that the United States shall not fall behind any nation in the world in its power."

* Sen. Stuart Symington, former secretary of the Air Force, was the key figure in the debate over the Air Force's budget. He had been instrumental in the formation of the defense review subcommittee when the Senate approved his amendment adding \$62 million for the Marine Corps on a 40 to 10 vote.

The \$51 billion budget approved

Aviation Week's Role

Other appropriations approved by both the Senate and House, as summarized in the Encyclopedic Almanac, were:

* Naval aircraft and related procurement, \$665 million—\$1 billion below the Fiscal 1955 allocation. Navy Secretary Charles Thomas has testified that procurement requests would increase sharply, starting in Fiscal 1957 (AW Feb. 21 p. 84).

* Air Force research and development, \$750 million—\$12 million more than the Fiscal 1955 allocation.

* Naval aviation research and development, \$165 million—\$7 million less than Fiscal 1955.

Pointing out "we have been going down, to take more, every day and the recent political shifts of administrative members have slowed up at the top by two infections," Symington, during debate on the defense bill, complained:

"The request for more money to

support the increase in the production



TO THE WING'S HONOR An Air Force helicopter carries high military officials from the Pentagon to meet headquarters of the 10th Special Forces. Twelve of the 20-passenger Prowler aircraft were used to move high military and civilian dignitaries from Washington and vicinity during the Monday, July 11, defense test. The helicopter also was utilized for counter-service

speed up the production of the long-range B-52s was made by the Department of Defense, and other Senate committees downplayed the fact, and an administration magazine (AVIATION WEEK) has released available details about the Marrow flight.

Feb To Release Photo

Although originally in Alsos" had the opportunity to see these flights Symington observed "as far as today" that "none of these planes have never been disclosed and released to the American people."

Of the five fixed categories of an power-fighters, light bombers, medium bombers, heavy bombers and missiles, Symington disclosed, "The Soviet is about in two, probably ahead in two more. The United States is about in one."

He commented that we are now told

by the Department of Defense that the Soviet Union "presently" stand a number of operational and test fighters and missiles light jet bombers.

Latest intelligence would tend to show that the Communists have pressed on in the production of medium range jet intercontinental bombers, Symington said. "An extrapolation based on facts contained in the Communists are ahead in the missile field—well ahead with the intercontinental ballistic missile, the ultimate weapon of last in our race. Our medium bombers are in two, but the United States is substantially inferior to the Soviet, he said."

Sen. Smith's View

Pointing out that the number of Defense committees has grown from four when the Senate was organized in 1947, to 11, Symington called the Pentagon a "bureaucratic empire unparalleled in the history of our government." He said that of the administrative committees were divided up at the top by two infections: "half a billion dollars annually would be needed to finance the program," he said.

Sen. Margaret Chase Smith (R-Me.) challenged Symington when he criti-

cized the President for supporting a reduced Air Force goal of 95 groups, instead of the original goal of 70 groups. This, Symington said, before the outbreak of the Korean war in mid-1950.

Commenting that Symington was wedging in the leaves of hindsight, Vice-Senator observed that although Symington "initially took a strong stand

for a 70 group Air Force at that time as his position as Senator of the Air Force. I do not recall that he commented in public at any time that stand."

Symington replied that "when it came about the Air Force was to be composed of only 45 groups, I disagreed and quickly gave that out as the position for my resignation."

Now It's Defense News Only If It's Useful, Valuable or Interesting'

By Claude White

Washington, D. C.—New friends to help Defense Department officials with confidential information from the public are being brought on board the Pentagon.

One of them is a "guide" that industry news sources use to evaluate "whether one can think of" and decide whether to support the news to a questionable public interest. Others are "experts" who frankly say the news will make them withhold replies to news stories separately to be on the safe side.

Source of the standards is R. Karl Holoman, Deputy Assistant Secretary of Defense for Public Affairs, who was drafted to the Pentagon about a month ago from the Office of Strategic Information at the Commerce Department. His latest step in curving out Defense Secretary Charles E. Wilson's office is to have the public information office "disseminate" news stories of a new development standard stating that information must not be given out unless it meets the test of being "useful" or "valuable" or at least "interesting."

An example given by the Army, under which circumstances have been supplied with parts of a loan "Balance Sheet for Strategic Information," a type of score board which lists in some 30 boxes how to fill up at a glance to help the judgment of a public information office.

The "balance sheet" bears the sig-

nal of the Commerce Department and evidently is a status draft by Holoman's office before he moved to his Pentagon post. It ranks upon a similar public information office whose tenure training has taught him to advise all sources within the limits of military security, to grade the news.

The information office is asked to weigh whether the news will be helpful or harmful to the United States and, in some case, be degree- "racy" on "Info."

There are five items under which a piece of reported information must be graded:

- * Not effect on military power
- * Not effect on industrial power
- * Effect on morale
- * Other strategic angles
- * Other considerations

It is here that the information office is given extra latitude to enter "nothing" row can thus be. That is to decide how closely held or how far it will be to the nation's interest by dissemination of the info in the light of "anything you can think of."

As a government manager he is asked to make his decision "in not balance, all things considered."

Order 'Costs Debate'

Other items which a public information office is asked to pass judgment include such minor factors as would open the possibility of a hostile nation, the safety of the U.S. and in

energy to fight a war, improve the economic foundation and combat acts of sabotage.

Housman's utilization of the "water-cooled" name is held to be an exchange of letters between him and J. R. Wiggin, managing editor of the Washington Post and Times Herald. Wiggin is chairman of the Board of Directors of the American Society of Newspaper Editors.

The editor challenged Housman's program to set up a new "gray area" of data that is classified but which he thinks may help an editor. Wiggin said that Secretary Wilson's order "has not done up all classification . . . from the Defense Establishment."

Tests To Meet

In reply, the deputy assistant secretary denied the intention is to "fix the availability of information to that which is self-serving." He said the public is eager for certain facts and needs them to "play their part as citizens."

He added:

"There are, nevertheless, many cases where demands for information which take up the time of people with busy schedules do not truly merit the designation of being useful or valuable, nor yet very interesting to the public. That is something that should be set."

Wiggins came back with the observation: "An official inside the Defense Department is likely to suggest an compromise, information that does not hit his own interests. Please note that outside the Department were very well aware these distinctions at committee and public service."

The editor also declared that the nature of a democracy requires a continuous flow of information from the government to the people, not only of facts the citizens get "posture to the welfare of government."

Anything else, Wiggin said, "is an indefensible philosophy in a free society."

Nebraska Complaint

In the past few weeks growing concern over Administration efforts to stifle the flow of news has resulted in a rising tide of complaints from Washington reporters. Veterans sources on previously off-limits details of Congress and the Supreme Court are complaining of the difficulties in getting news and the inaccessibility of policy-making officials.

There also are estimates of high-ranking personnel who are less than honest in answering queries. One Washington correspondent of many years experience says, "A Cabinet officer has had to lie on two recent occasions

It never happened before. Somehow, these men see no reason why they should not lie to a newspaperman."

Copies of Housman's "balance sheet" were passed around between him and J. R. Wiggin, managing editor of the Washington Post and Times Herald. Wiggin is chairman of the Board of Directors of the American Society of Newspaper Editors.

The editor challenged Housman's program to set up a new "gray area" of data that is classified but which he thinks may help an editor. Wiggin said that Secretary Wilson's order "has not done up all classification . . . from the Defense Establishment."

Wiggin said the sheets were not cast as an experiment at Housman's request "in just how they would work in the field."

He added that he did not think they were necessary for experienced public information officers, "but we thought that might prove helpful to some of the government's less experienced ones."

Former public information officers refused to use the form, saying they could not judge such matters.

A Commerce Department spokesman said the "balance sheet" was prepared "in consultation with principal trade and business publications." Efforts to find a publisher or publishing group that was interested were unsuccessful.

Aircraft Industry Cuts Costs, Says Allen, Refuting Subsidy Charge

Scuttle-U. S. aircraft industry is making "great strides" in reducing and controlling the cost of aircraft production, William B. Allen, president of Boeing Airplane Co., told last week.

In Boeing plants alone, efforts to improve efficiency and cut expenses saved the government nearly \$100 million during the past several years, he told the Washington State Bar Association. The cut-costs program returned an additional profit to Boeing of less than \$10 million.

Profit, Competition

Allen stressed statements that the aircraft industry is making too much money and lacks competition. He referred to three changes effected by the industry.

• **Annual profits.** In 1954, our Boeing's profits amounted to 3.5 percent of sales. For a number of years prior to that, when the aircraft prices per unit were at their peak, our return was approximately 3.5% of sales. These figures are indicative of the aircraft industry. This compares with an average return of 5.7% on net sales for all manufacturing industry in the United States.

In only three of the seven years since the end of World War II has the aircraft industry won a return on net worth greater than the return for all manufacturing industry. In that same period it is below the average for all manufacturing industry.

The three years during which Boeing and the industry experienced a high return on net worth are 1952, 1953 and 1954, during which time the industry was building to a peak. Present industry programming reduces the volume of business for the industry will now decline from that peak, with the result that the percentage of return on net worth will naturally decline because of lower total profits applied to

higher net worth figures due to reduced earnings."

• **Industry competition.** "I make the overwhelming statement that the aircraft manufacturers compete in high performance . . . the B-52, for example, was designed and developed over a number of years. During that period it had strong competition. In fact, the project was close to death on a number of occasions."

"I assure you the B-52 has had a very productive life and, as it has in the past, will in the future be challenged by the products of our competitors."

Subsidy Critic

Boeing's president also struck at an industry official who claims it receives large subsidies from the government through grants and subsidies for aircraft production.

He also stated the stability of aircraft companies is probably all they need for production largely is due to these two factors:

• Long development times required by the aircraft industry that require production for beyond normal needs.

• Industry earnings over the years have not enabled it to provide itself with necessary equipment and plants to meet these demands.

Pilot Blamed in Crash

Crash of an Alaska Coastal Airlines plane was probably the result of loss of control while the pilot was attempting to execute visual flight at less than required altitude and weather conditions, Civil Aeronautics Board reports.

The crash occurred while the pilot was approaching a mountain pass between Fairbanks City and McGrath in poor weather. The pilot died of injuries, and two passengers were seriously injured. The single-engine, Cessna 180 aircraft, was destroyed.



WING SWEEP BACK AND HIGH ANGLE OF THE XF8U-1 AS SHOWN IN THE PHOTO TAKEN DURING FLIGHT TEST AT EDWARDS AFB.

Supersonic XF8U-1 Details Revealed

Design features that fit Chance Vought's XF8U-1 for its role as carrier-based interceptor are revealed in the first part of a technical report on the supersonic fighter.

The Navy asked for high rate of climb, extreme altitude capability and high supersonic speed.

Wright engineers considered the low-drag characteristics of a wing that, excepting with the high aspect of a Pratt & Whitney J57-P-4 with afterburner at a high-altitude altitude of simple design.

Aeroelastic Design

The high mounted wing sweeps back approximately 40 degrees and is a small delta with a single vertical stabilizer. The ratio is very low, in the order of five percent at the tip. The outboard panel of the wing has a leading-edge extension, the outer leading edge of the wing appears to sit on a droop nose flap.

Leading-edge surfaces have been blended out as the photographs. There are two possibilities either leading-edge slats are used, or spoilers handle the lateral control.



EXTREME THINNESS OF WINGS AND LOW SETTING OF WING TIP SHOW UP IN THIS VIEW. XF8U-1 LENGTH IS ABOUT 56 FT., WINGSPAN IS 18 FT.

and fair downward visibility over the nose in carrier landings.

Other features of 20 man aircraft are reported below and behind the pilot's seat. Cockpit layout and design follows current Navy practice. The ejection seat is the light-weight Chance Vought model (AW, Apr. 16, p. 96), adapted from the original Douglas AirCraft Co. design.

Overall length of the XF8U-1 is about 58 ft., and height to the top of the vertical fin is about 18 ft. Maximum fuselage depth is small but, the wings close the ground by six feet.

The major feature in the fighter's design is the use of the fighter's vertical stabilizer as the engine, mounted about the same height as gear well.

Fuel tanks are in the fuselage ahead of the engine, there is no nose in the front wing fairing for fuel storage.

Parts of the rear and middle fuselage are made of titanium alloy for high-temperature strength and lightness.

General shape of the fuselage is slab-sided with gulls rounded top and bottom. Canopy top line breaks above the fuselage only slightly, then drops sharply

to the cockpit.

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Destroying 6 More Comets, RAE Tells Aeronautical Conference

Los Angeles—Six de Havilland Comet JAS 1As will be destroyed in the water tank of England's Royal Aircraft Establishment, hangar to right of the Comets to be tested for pressurization failure.

This was disclosed by Percy F. Waller, head of the RAE Structures Department, at last week's Fifth International Aeronautical Conference, a part meeting here of the Institute of the Aeronautical Sciences and the Royal Aeronautical Society.

Waller, in the frequent session of the conference, and water testing of a Comet IIa already has started at Farnborough. Waller is building a tank to water test the Viscount, he said, and de Havilland will conduct its own water test at the Comet IV.

Measfield Presents

Three plans for wholesale destruction of British transport aircraft brought a protest from the chief executive of British European Airways, Peter G. Measfield, who expressed the hope that the Farnborough water tank could not be ruined "in the RAE Aeronautical Society."

The Comet was obviously too far and not strong enough," Measfield declared. He suggested that the Comet aerobatics were causing the British to be over-cautious about fatigue of aircraft pressure cabins. A 30,000 hr.

Most Precious Element

Los Angeles.—The aircraft industry must make better use of its engineers, Lockheed President Robert Gross said in the opening session of the 1958 Inter-national Aeronautical Conference.

"Four out of eight and sixteen living what they are, we must urge industry to the fact that we are not going to get many more new engineers now," Gross said.

He argued engineering capability "the most precious element" in the whole aeronautical process.

"If we could get a better, simpler, a different approach by our industry to the problems of developing new [aircraft] types we might expand ourselves now and thus to what could be done," Gross said.

President Noland E. Rose of the Royal Aeronautical Society told the opening session that aeronautics is a key to peace. He not at a more capable of achieving revolutionary developments than any other time in the world today.

This aspect of the RAE Inter-national Aeronautical Conference was proposed by Aviation Week West Coast Editor William Coughlin and Senior Engineering Editor Irving Stone.

hangar will be a satisfactory solution, Measfield said, and after that the water tank should be retired.

"Can you think of any better plan we could put these Comets in?" said Waller. "The Comet IIa will provide a never-to-be-repeated opportunity to do something serious to pressurized failure."

Jet transport designers from Lockheed, Douglas, Convair and Boeing found the opportunity for public debate on the often-felicitous prognosis and sound cast of the discussion, leaving the floor largely to the British.

America's Reply

The U. S. answer came from Richard V. Rhode, assistant research director of the National Advisory Committee for Aeronautics. Rhode reported on NASA work which indicates that about 80% of the stress of pressurization will relieve the possibility of explosive decompression, and allow the chances of fatigue cracks below that become dangerous.

This differed from the RAE's sole conclusion that the aircraft's fuselage also must play a part in preventing the hazard of explosive decompression.

The joint meeting, held for the first time in California, was a highlight of a two week visit by more than 100 British engineers and executives to exchange views with American designers.

Viscount Seeson on RAE

Chief Executive Measfield of BEA told when he pointed out in a接着的 hearing with news of forthcoming Lockheed and Douglas fuselage aircraft that British European Airways made the world's first commercial jetliners powered passenger flight last year with the Viscount prototype.

Since then, Measfield pointed out, BEA has flown a total of 57,000 hr on Viscount flights and 30,000 engine hours with Rolls-Royce Dart engines installed in 30 aircraft.

The scheduled RAE Viscount series has earned a net profit of \$2,750,000 at the rate of \$500 a flying hour, and \$24 profit for every mile flown. Results had factors has averaged 143% on direct aircraft costs and 60.6% on

total costs, including all overheads, interest on capital and other finance charges.

These figures were established over an average service distance of 690 mi. at an average block speed of 225 mph. "Over all these routes," Measfield asserted, "The Viscount has materially improved RAE's competitive position and has dramatically increased the ratio of traffic won by BEA against such excellent aircraft as the DC-6B and Convair, operated by all airlines."

It is similar like a strong British sales pitch for the Viscount as the fact of current announcement of the Lockheed Electra, there was no one around to argue with it on the official program, at least.

Production Lines Talk

U. S. industry will produce aircraft the following British delegations learned aircraft in the Los Angeles and San Diego areas, visited the Air Force Flight Test Center at Edwards AFB, and inspected NASA's Ames Laboratory at Moffett Field.

As one British delegate said, "It isn't Farnborough but it is rather impressive."

Other highlights came from papers by:

• **Horace Kelly**, chief engineer of Bell Aircraft Corp., Texas, Illinois, and New Bedford, for a prolonged tailless helicopter which he has now. He discussed model tests of the configuration which, combined with boosters, has control, three main boosters, tail control, three main gear. The whirling test rig has indicated that nose downwash will have a stabilizing effect on this "flying wing" configuration, reducing wing load to gravity, Kelly reported.

• **Edmund H. Heinecke**, chief engineer of Douglas Aircraft Co., El Segundo, discussed some of the problems encountered in developing a supersonic transport. He added to his general comments on tailoring, packaging and stability, made some interesting remarks on specific Douglas aircraft. Use of a lower horizontal tail on the A3D would have improved its stability at the stall, he said, but this was gained because of the adverse effect of locating a tail in the jet engine exhaust.

While the light-weight A3D is stable without tails, tails were employed because of the "very large gain" in moment of inertia. Both on the F4D Skymaster as on various low speed lateral flight characteristics, he said, Douglas tested better generation to the next effective means of curing lateral instability, and in the case of the A3D, too, compared to the A3D and F4D brought flight characteristics on these two aircraft from unsatisfactory to satisfactory, according to Heinecke.

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French Fly Rocket, Ramjet Fighters

By William A. Watson

Paris.—The last two days of the 21st Paris Salon d'Aeronautique were devoted to showing in action to the air what had been displayed earlier on the ground. It was a memorable flying show with hot flying sessions on Saturday and low flying on Sunday.

The French flying was not the tightly-integrated, closely-controlled type of show seen at Farnborough in England, but it was certainly the most interesting as display seen in postwar Europe.

Top of the acrobatic bill was the laterally-pitched Leslie 021, the flying dutch with the saddle nose and "six-eight-thousand" engine. Its performance deserved any doubt as to what it could do in the air. From its position atop the Langleyfield machine, it zoomed out at 6,000 ft. over the center of the audience, it whirled to port, and within a quarter mile of its nose, the ring of the propulsive duct could be seen.

Maintaining altitude, the Leslie rapidly built up speed to what appeared to be around the 600 mph mark. It appeared to be very maneuverable and left no trail of fire. Only an orange colored smoke could be seen burning in the rear fuselage.

After some passes, Pilot Esthoff stopped and ran the engine. He descended to a position in the Langley by swooping out two circuits of the airfield at well under 1,000 ft. The lightened Leslie glided in for a very slow landing. About 20 ft. above the runway it assumed a roll-over-to-landing attitude. After touchdown it pulled up extremely short.

It was a roll-over. Two white paths of white at an estimated 5,000 ft. were taken by nose to signify the passing of Mach 1. It would be difficult to say but they looked more like puffs from the combustion nozzle than were solid sonic booms.

The Trident was back in the air the second day, slightly heavier and did not fly on Sunday. It left on double, however, that rocket will make a pass. Moreover, Didier did its success on the next day.

Fine Breathing Series

The Trident replacement was in progress, the R-1000—a conventional single-engined flying machine with a rocket discharge orifice inside the rear fuselage some 100 ft. or more ahead of the F-100 type of pipe. Again there was a light up at the start of the run with the white flame and very high speed over from the single rocket. Again experimental rates of climb were shown.

The rocket motor was out in and out for the first time, with white flame, light and red puffs of burning smoke as combustion. With what that one motor did for the R-1000 at low altitude, there can be no doubt of

the French claim for the Trident when two or all three boosters are blasting together.

Fresh in the fine breathing arena was a night fighter Meteor Mark 11 carrying a normal fuel load and, below its port wing and a small diameter, parallel solid range in place of the standard underslung fuel tank.

The Mark 11 had sound for long periods with an 8 to 10 ft. stream of orange colored smoke flame coming from the front.

Neither rocket nor aircraft were really noisy and all seemed to be well under the control of their pilots.

France without a doubt has more practical experience with ramjet rocket than anyone else in postwar Europe. An indication of what can be expected is the fact that already the Trident total combined thrust exceeds 600 weight which is the formula for two ramjet rocket using propane.

Break Chutes, Skid Landings

Droping the Bock Roger staff, the small delta Caudron Sigtair prototype got off the ground in its single Aire tailplane after a reasonable start and clanged with surprising aplomb. It looked extremely fast, rolled very rapidly as it flew on and appeared to burst out of its rails, also a delta trademark.

Not Tancet brought the Gerbier in to test with his windmill. The ribbon-type chute stopped it in a surprisingly short distance.

The breaking chute appears to be well established and at much as part of the science of things in France as in America. It is used both experimentally and in production.

New British Data

Based at the Paris air show flying display was reported to have an audience on the public address system give performance Spans in French and English on the latest two Vickers types.

The RAF Hunter FGR.2 and the Avro Vulcan which flew over from England for the show were announced as doing 754 mph at 50,000 ft. which is Mach 2.

Plans for short takeoffs and steep climbs were shown between an English Meteor, Canberras and a Gloster Javelin.

The Gloster's aerobatics and speed were exceptional. The Royal Air Force Hunter aerobatic team pulled pencils lower from the Avro's composite fire rails as they maneuvered.

Safety Emphasized

The *Paris* flying display opened under the long shadow of the rate of accident in Le Mans—the previous week, which killed 62 people and injured another 190. A committee charged with the protection of spectators

French public opinion was high after the Le Mans tragedy and government officials seriously considered canceling the flying display. The show went on with 35 participants, 250 drivers, 1,000 boats, speed record, mostly emergency routes and thousands of police to control the crowd of 100,000 spectators.

Flight meetings were strict with many safety precautions imposed on planned maneuvers. The pilots, particularly the French, were obviously feeling forced to stay far within safety margins imposed during *le Mans*.

truly and on service aircraft such as the *Ventor*.

An aerobatic by a Mistral-France developed Vierling—and two Baracudas, the double-leader technique seemed quite natural. The pilots performed rough and dirty aerobatics, the *Ventor* and the *Baracuda* performing tight turns and dives, to stop as soon as possible to be about 1,000 ft. They set fire and within 3 min. of touchdown, were taxiing away on the trolley onto which they had been landed and escaped by the quick-reactive brake and release fire.

Trolley safety leaving the bungee on the ground and also turning it about, was demonstrated to show that the science was out of the storage and a working proposition.

In flight, the pilots demonstrated dynamic capabilities and the high performance and aspects of its aerobatics.

Ambitious Aerobatics

Various units of Mistral, were shown together with their old relative the single-winged *Champ*. Four of the later, mounting wingtip tanks, comprise the aerobatic team of the French Air Force. In standards of aerobatics flying, this group ousted the USAF's perched F-86 mounted Skystreaks, although the French aerobatics were not so ambitious.

An operational squadron of fighters, *Tir-Ventur* presented Mistral Mock to great effect. Coming into squadrons service in Mistral is the Soviet *Shvetsov* engine, licensed in the U.S. and Britain. The fighter display was convincingly demonstrated on a *Mystere* Mark 3, which after landing short proceeded to back up as a runway first sloped up behind the pilot.

Another version of the *Mystere*, this time a Mach .9 two-seater night fighter, took off for *Tours* 300 km. away, carrying the *Le Mans* trophy for the racing drivers. This fighter looks much like a *V-100* Sabre. It carries 30 mm. cannon and rocket and is intended to lead cavalry, controlling a force of 1,500 gal. of fuel it carries internally.

Strikes NAA Influence

The North American Aviation influence is strong in all the Dassault designs, emphasizing the Super *Mystere* with its sloping nose and horizontal nose intake. It also sports a flat tailplane mounted on the fin.

A 10,000-lb-thrust afterburning Avon turboprop is said to give a low aspect ratio, although the demonstration at *Le Mans* was somewhat disappointing. It looked lower than the *Hustler*, which was flying much lower and making a great deal of noise at a reported Mach .34.

The Super *Mystere* was said to be doing just 500 knots and arrived much later than its fellow barge. The *Mystere* Mach .48 arrived ahead of its supposed barge.

All the *Mystere* series showed the essentials of good aerobatic stripouts. They took off and landed smoothly, climbed well and seemed really steady in the air. Their rates of roll were universally good. Allison control surfaces precise and accurate.

Fast-Climbing Vostoks

Four all-weather and heavier twin-engine *Vostoks* took the air from their B-47-type tricycle landing gear, getting off smoothly and climbing well.

It was announced that the *Vostok* reaches altitude just under 40,000 ft in under 6 min., which can give the interceptor a surprise to think about.

Some were fitted with *Albatros* tanks, others with *Sopwiths*, the latter giving off the losing one seat feature that those who have been seen the *Vostok* despise.

The *Vostok* is equipped with 720-lb. total load speed but seemed slow to the eye. At 40,000 ft in appearance weight, the *Vostok* rolled fast for a plane of its size and gave very sudden warning of its tendencies to proneness.

The fighter versions carry a pair of 30 or 55-mm. cannons, rockets and guided missiles. The heavier will carry three-bomb bombs. It was seen to have two tons down and carried four bombs of what appeared to be 1,100 lb. Each wing mount, the leading dimension was moderate.

Canards Fly-By

The *Canard* brought the house down at France's first jet transport. It is to carry 70 to 90 passengers, with a

still air maximum range of 2,300 mi. The range is slightly reduced for longer European and North African routes of 1,900.

In flight, the plane resembles the 170-hp *Le Mans* flying *Velutine*, whose name it takes. In great heat and roller coaster it with a high propellor appearance.

With 28 flights and 15 hr. in cockpit it did not land at *Le Mans* but demonstrated steep turns, maximum speed and very slow speed flight most of the time.

It uses the unshinkable *Comet* nose section and carries much of its fuselage in front of its moderately swept wings. Passage gauge is much heavier and stronger, spacious and comfortable. The 10,000-lb-thrust Avon turboprop is very strong. From the rear fuselage, the *Canard* has an extremely clean-looking appearance.

The wings seem to be of narrow chord and are huge in span, extending right out of the ailerons.

The *Canard* handled well and should be ideal for French routes.

Light Jet Brigades

Most intriguing was the performance of the *Hard-Dihedral* Model .32 high-speed ratio wing *Dakota* rephotographed, originally by Air France and the French Navy. They pull off in under 1,500 ft or less and turned tightly within a small part of the *Ariane* and *Le Mans*. Landing was as short as takeoff.

Among the light brigades, the small jets were impressive—*including the Sopwith*, the *Mystere* anaerobic form of *box* and a *Velutine* that was shocked about the strength of its gear.

The *Velutine*, half-finished *Fokker* F.11 was magnificently flown by *Sader* man, who did a long spin down from the top of a vertical climb.

The *Fokker* also flew well, doing extreme turns down from a vertical climb.

Quite unique among the small stuff was the 10-ft-dia *Peyen* probed by a single 350-lb thrust *Turbomeca Palas* at over 300 mph. It puts out in the base of the fin. The *Peyen* is to be followed by a *Viper* or *Twin Mustang* version.

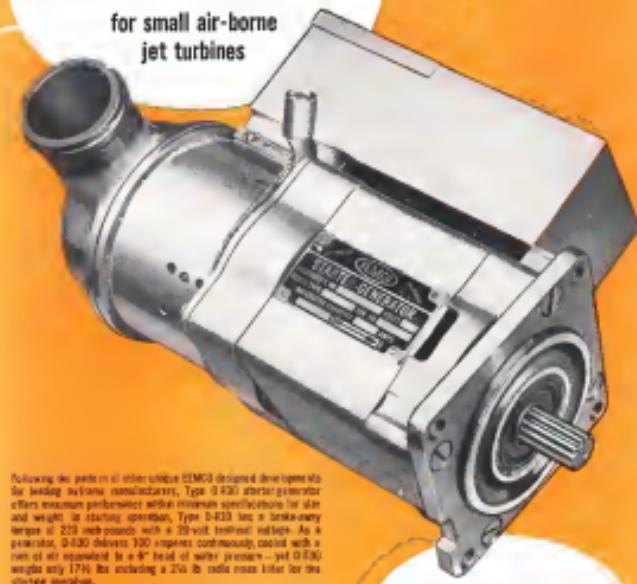
French pilots do not seem to employ extreme maneuvering, landing the *Peyen* and like the *Velutine*, it landed fast on approach. The infrared powered *Alois* was the most impressive of the amateur helicopters by virtue of carrying a small *Choban* van round the nosecone.

(This is the second of three special reports to Aviation Week on the 21st Paris Salons Aeromaritime and *Salon des Industries de l'Aeronautique*. Write to Aviation week, 1000 16th Street, N.W., Washington 6, D.C. for complete information.)

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technical bulletin



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CAB Stands Pat in Pacific Case

The Civil Aeronautics Board has rejected appeals of Pan American World Airways, Transocean Air Lines, and Trans World Airlines for interpretation of the Board's decision in the trans-Pacific certificate renewal case (AW Feb. 16, p. 12).

Reconsideration petitions of the three carriers were denied by virtue of a Board statement. The vote was 2 to 2 on the petition and they voted for want of a majority. CAB Chairman Ross Radis did not participate because he did not take part in the original decision.



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New Military Aircraft Order Lag Continues

New orders for aircraft and related procurement postponed to lag through April, and Air Force and Navy had an unobligated balance of \$3 billion on hand May 1—just two months before the close of Fiscal 1955.

Of the total unobligated fund USAF had \$3.7 billion and Navy \$2.8 billion. Navy had net obligations of only \$79 million through April. USAF's unobligated balance was about \$22 billion.

However, Appropriations Committee's free ride was reduced by \$190 million USAF's fiscal 1956 funds for aircraft and related procurement because the

earmarks of Fiscal 1955 funds would be greater than expected. The procurement and the carriers would be \$2.9 billion. But the outlook is that it will be even larger than that.

To reduce an May 1 unobligated balance of \$3.5 billion to \$2.8 billion by July 1, the Air Force would have to obligate \$1.4 billion monthly during May and June. USAF's average monthly obligations for the first 10 months of the year were \$584 million. Navy's obligations for the first 10 months of Fiscal 1955 totaled \$724 million, an average \$72.4 million monthly.

The Air Force provided funds for aircraft and related procurement on May 1 was \$19.8 billion. That was divided USAF, \$13 billion; Navy \$6.8 billion.

Banshee Landing Seen From a Banshee . . .



These photos of a McDonnell Banshee landing on the USS Oriskany in about 110 knot wind were taken from an F3H-2 photo Banshee aircraft off the coast of California. The photo ship has a K-8 forward-firing aerial mapping set nose cones in its bays.

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Gas Turbine Improves Performance

By L. J. Nossel

The introduction of the helicopter, noted for its low speed flight characteristics, appears to be an encouraging note in the transport race.

A second place seems to be the helicopter, but the jet aircraft, is being introduced to long trips with engines a rapidly increasing long range. The ability of the helicopter to operate in downtown metropolises area eliminates the need for a long nonstop part of an airline trip of less than 200 at 300 mi. in the low rate to and from the airport. Using the carpet service in a quick time distance is 100 mi.

The helicopter has the speed and maneuverability of an transport aircraft, a great many smaller cities that have not been able economically to justify an airport but could maintain helipad facilities. Thus, there is a considerable increase in speed over the ground transportation area involving these areas.

Speed itself is not a completely reliable commodity. The success of the helicopter in a commercial transport vehicle will depend on how well it can measure up to competing forms of transportation in terms of safety, comfort, convenience and economy as well as how much it can decrease travel time. Helicopters in commercial passenger transport today are limited since there is a definite need for the passengers since they can provide, even though they have something to be desired as respect to some of these other factors. But, before the helicopter can hope to achieve widespread acceptance for commercial transport use, significant improvements will have to be made. One such improvement could be the gas turbine engine.

It won't take the Korean conflict had proven the utility and value of the

The author is a member of the Board of Directors, General Motors, Detroit, Mich.

helicopter that the government agreed to direct a part of the gas turbine industry's activities to build smaller size, shaft power engines in order to adapt the powerplant to helicopter. Just as the jet engine has revolutionized combat aircraft, the gas turbine engine could make enormous gains in the short range of accelerating engines powered by helicopter.

Copter Comparison

By taking advantage of the experience of large jet engine development, it is now possible to design and build gas turbine engines with specific fuel consumption comparable to reciprocating engines at the higher powers or, quite, for helicopter operation, with specific weights less than one third of that of reciprocating engines. This efficiency and light weight, combined with the simplicity, reliability, and flexible speed-power relationship of the gas turbine engine can underlie significant improvements in the design factors which affect the success or failure of the commercial transport helicopter. Speed, safety, comfort, and economy.

In order to find out just how significant these improvements can be, let's consider two hypothetical transport helicopters, each with a gross weight of 17,000 lb. One of these can be powered by two 1,250 hp gas turbine engines (Fig. 1) so that full advantage can be taken of the rotor characteristics. Fig. 2 shows the same power required vs. flight speed for the two helicopters. The use of the turbine-powered helicopter can operate with a top speed of 150 mph, but takeoff and hovering weight of 660 lbf, for carrying a 600-lbf payload with a constant rotor speed of 100 rpm. The 10% increase in static thrust of the reciprocating engine doesn't fall off as much as a 10% decrease in the power of the other helicopter can be powered with two 1,000 hp reciprocating engines. With the 10% increase in static thrust, the maximum flight speed can be increased from 140 mph, to around 170 mph.

Increasing power is required with higher flight speeds. If the reciprocating engine, higher power means higher specific fuel consumption. As a result,

one will be eventually the winner.

The maximum flight speed for a helicopter is usually limited by retarding blade stall which is a function of rotor tip speed. The higher the tip speed, the faster the retarding force on the blades, necessitating more thrust. In contrast, it is more economical to obtain a higher tip speed in order to obtain maximum thrust and low specific fuel consumption.

With a reciprocating engine, horse power output is directly related to the speed, with the high power needed for takeoff attainable only at a high engine speed. At the lower cruise power setting, the engine should operate at a low speed to obtain highest efficiency and longest life. The result is that the helicopter must be operated with a constant speed as a compromise between the high engine speed and low rate speed desired for takeoff and the low engine speed and high rate speed desired for cruising.

Speed Increased

In the gas turbine engine, the two basic that produce the output shaft power is not mechanically connected to the compressor and compressor-driven turbine. Its output power is nearly independent of output speed over a fairly wide range (Fig. 1) so that full advantage can be taken of the rotor characteristics. Fig. 2 shows the same power required vs. flight speed for the two helicopters. The use of the turbine-powered helicopter can operate with a top speed of 150 mph, but takeoff and hovering weight of 660 lbf, for carrying a 600-lbf payload with the reciprocating engines. With the 10% increase in static thrust, the maximum flight speed can be increased from 140 mph, to around 170 mph.

Increasing power is required with higher flight speeds. If the reciprocating engine, higher power means higher specific fuel consumption. As a result,

FIG. 1



FIG. 2

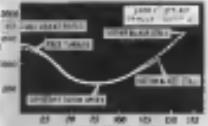


FIG. 3

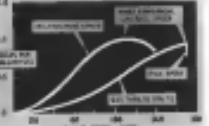


FIG. 4



The most economical cruising speed occurs at about 150 mph (Fig. 3) which is well below the maximum speed. For the turbine engine, specific fuel consumption decreases with the higher powers and hence the most economical cruise occurs at top speed.

Safety Contributions

In addition, the turbine engine is designed to operate continuously at its normal power rating using standard maintenance effects in its operating life. Experience has shown that operation of reciprocating engines for extended periods of time at or near normal rated power results in decreased service life. Thus, in commercial transport operation, the helicopter powered with the reciprocating engine will have a longer life than the gas turbine engine. The use of the turbine engine can be expected above normal frequencies. The gas turbine engine can be operated at 100% power, but the reciprocating engine can only be operated at 70% power.

This means a possible reduction of 30% in time of repair than 10%, sufficient for a vehicle whose existence can only be justified by its ability to survive.

Speed is only important as long as it can be achieved safely.

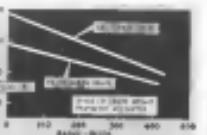
The helicopter in commercial service has achieved an outstanding record of safety. Shaft-in-operation programs are now being implemented in reciprocating engines to reduce the potential for shaft-in-operation.

The small size and high power to weight ratio of the gas turbine engine make it possible to install sufficient power to provide for an anticipated emergency.

There is 2,500 hp installed in one engine powered by the gas turbine engine for less than half the weight and fuel weight required to install 2,000 hp in the other with reciprocating engines (Fig. 4). This gives the pilot an extra 300 lbf, or more, to play with.

Both of the turbines are capable of maintaining level flight on one engine in the event of a failure of the other engine. But what would happen in the event of an engine failure on a hot day during takeoff from a very congested area where the pilot had not gained sufficient altitude or forward speed to permit him to fly on one engine? If this becomes necessary to

FIG. 5



be able to lower with one engine not enough to land.

With reciprocating-engine power, it would require the installation of a third engine in addition to two engines to provide the required extra engine should a power accident. This would be somewhat prohibitive from the performance standpoint.

A third gas turbine engine could be added to the other helicopter, and it would still have an empty weight advantage over the original two-engine reciprocating installation.

But the characteristics of the gas turbine make the third engine unnecessary. While excess power is required for short trips or parts of time the turbine can be operated above normal frequencies. The gas turbine engine can be operated at 100% power, while its turbine power is somewhat less than 115 mph, while its turbine power is somewhat less than 115 mph.

This means a possible reduction of 30% in time of repair than 10%, sufficient for a vehicle whose existence can only be justified by its ability to survive.

Fatigue and Noise

Fatigue is another important factor in aircraft safety. The helicopter is particularly bad in this respect because of the high degree of pilot concentration required to fly it.

How the gas turbine engine can offer some improvement over the reciprocating type is the result of the gas turbine engine's simplicity and its small volume power plant for all normal operating conditions, maintaining the rated constant at a value fixed by the pilot. It is necessary, for the pilot to keep the engine control at one true cruise normal flight conditions with reciprocating engine he must adjust the engine throttle to maintain desired cruise speed.

Pilot fatigue is also directly affected by engine vibration and noise level. The vibration in particular, however, is the primary factor in helicopter noise. Another factor of potential is the noise and heat, noise, vibration, and heat. Fig. 5 shows a comparison of the payload which the two 17,000 lb. helicopters can carry for various ranges.

For a range of 100 mi., the turbine-powered helicopter could carry 25 passengers while the reciprocating engine-powered helicopter could carry only 15 (Fig. 5). Then, for the same trip, using the same gas turbine, the ob-

FIG. 6



jettable vibration noticeable on the reciprocating engine power plant is enough to make a dry wheel in reciprocating engine oscillate to partially unbalance them on poles, but weight is extremely small and it would be impossible to install a drywheel large enough to completely damp these oscillations.

The gas turbine engine derives its power from continuous burning of fuel in the combustion chamber and a continuous flow of air through the turbine wheel. There are no power pulsations. What little vibration is induced by the engine will be at low magnitudes and high frequencies, which is not sustained.

The gas turbine turbine takes fuel from the engine in an additional fuel line that is introduced into the path of the exhaust gases to extract the energy from them in the form of shaft power. As a result this turbine wheel starts as an electric motor. This can use two separate experimental gas turbine installations have indicated that the noise level is at least 10 decibels lower than with a reciprocating engine in the same situation. In addition, the noise from the gas turbine is of high frequency and can easily be eliminated from the engine and passenger compartment with lightweight soundproofing material.

Turbine Economy

The fuel economy of whether or not the helicopter will succeed as a commercial transport has in its essence. The gas turbine engine can make the most important contribution to increasing revenue and decreasing operating costs.

The low specific weight of the gas turbine engine is its most significant advantage because, in every power requirement, the reciprocating engine is heavier. A 17,000 lb. helicopter with another power plant of 4,000 lbf can carry 25 passengers. Fig. 6 shows a comparison of the payload which the two 17,000 lb. helicopters can carry for various ranges.

For a range of 100 mi., the turbine-powered helicopter could carry 25 passengers while the reciprocating engine-powered helicopter could carry only 15 (Fig. 6). Then, for the same trip, using the same gas turbine, the ob-

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THRUST & DRAG

From Del. Bear, a Lockheed designer who has earlier commented on such diverse subjects as supersonic fish (Salmon) and Mackinac Islands, comes this story of how some Super Constellations were held on the ground by a bunch of threads.

The stand-pushing material was to blame if it didn't meet fireproofing specifications and delayed flight rollout of a batch of Super Constellations. Then, threads tied them down.

Bell Telephone's little propaganda folder that comes with your phone bill each month is a fascinating journal, with local liaison, some material about Bell's contribution to the industry in the form, and clever arguments for keeping an extension phone.

One of the company's newest folders has a new intriguing thought about baking dust systems and filters.

With an option that a member 3,000 miles away, the bulletin states at the bottom of a page about Nite, she transmuted across the land a great variety of devices to go to work to track down that one telephone, out of many millions, and ring it off within a few seconds' time.

Now let's paraphrase that one: "When the fire-control officer checks a mobile communications, an enormous hoard of radar and Vikes go to work to track down one faulty replace, out of many attacking nests, and to blast it out of the sky within a few seconds' time."

You can get ideas from the dimdest

planes. . . .

There's a flap on in England right now about the lack of escort stats in new contemporary planes used by both RAF and Royal Navy.

Reporting the flap, the London News Chronicle quoted some suitable quotations about the situation:

"When the aircraft was designed, no escort stat was available that could be fitted into the cockpit layout," Sir Mervyn and Sonnen.

"When the specification was laid down in the Service department, no escort stats for the pilot and navigator were called for,"—Manufacturer of the aircraft.

"If escort stats had been fitted in, they could have been useful,"—Manufacturer of cockpit stats.

"The first escort flew in 1944 and the two-seater version in 1951. Surely something could have been done in all those years,"—Pilot.

So there you are. —DAA

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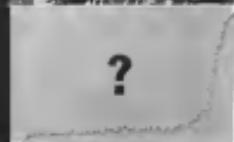
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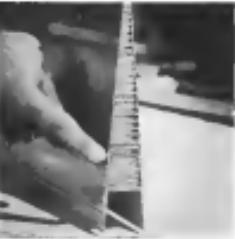
PRODUCTION



ALUMINUM HONEYCOMB is set up on bander's work for cutting. **DISASSEMBLED F-102 AIRPORT** shows how tapered aluminum core.



F-102 RUDDER with honeycomb panel. 10% more rigid than conventional structure. **F-101 STABILATOR** trailing edge has core.



New Fighters Use Resin-Bond Honeycomb

By Irving Stone

San Diego-Honeycomb structures are helping to accelerate the structural revolution in aircraft design.

All-metal honeycomb sandwiches bonded by resistance welding or braising are still largely under development, and bonded sandwich structures have been refined for production use.

Results of these structures include high strength-to-weight ratios, inherent stability and aerodynamic smoothness.

F-102 Applications

The important role mass-bonded metal honeycombs is playing in aircraft and related components is highlighted by Nasa's Mg. Co.'s production of typical parts for today's fast aircraft.

• **Convair F-102 wing tip.** This unit for the supersonic interceptor measures

approximately 4 ft long, 31 ft wide, with thickness tapering from 2 in to 3 in. The configuration has compound curvature incorporating a wedged part weight about 15 lb against a conventional leading weight reported to be about 150 lb at much. Constant speeded operating temperature is 240°F for unaccelerated operation, the part could go to 350°F max.

Honeycomb panels are 1 in. (front) fiber, 0.03 in. aluminum. Sheets are 0.06 in. thick. Spans are 10 ft, 6 in. Two 7384 extruded T-structure. Periphery is a series of staggered cutouts. Cladding and skin is 7187 formed sheet. Honeycomb is 3 in. thick with thickness tapering from 3 in to 2 in.

• **McDonnell F-101 stabilator trailing edge.** This unit is stabilator portion is approximately 8 ft long, 31 ft wide, tapering to about 1 ft in width at the

leading edge. The core is a magnesium alloy.

casting. Hinge and control arm fittings are machined from aluminum alloy forgings. End closure also are sheet metal.

Span is typical 7584. Under the skin, at the tip and lower closing rib is 0.040-in. solidified double.

In strength comparison with a conventional model of aluminum sheet metal construction, folded at 140% of ultimate design load. The aluminum honeycomb model of same weight load at about 170% of ultimate design load, proved to be about 50% more rigid than the conventional structure.

• **F-102 elevator trailing edge.** These components can be length from about 6 to 8 ft, are approximately 8 in. wide. Core is 0.06 in. 601 aluminum honeycomb with thickness tapering from about 1 in. down to 0.5 in.

Span is 7584 extruded. Face skin are semi-parallel 3701m 7481T6. Flanges are machined aluminum alloy.

A thin metal doubler extends from the span just over the hinge/rear of the unit.

• **F-102 wing leading edge.** These units can be about 11 to 17 ft in length. Reproducing skin flange and flange of the same size they are considerably weight.

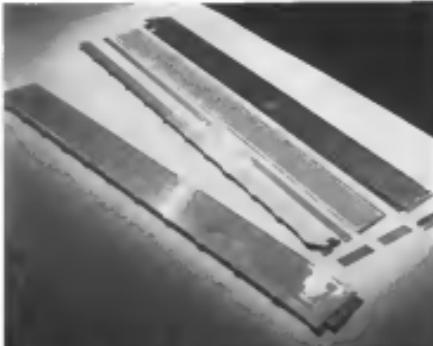
Core is 4 in. hex, 0.01 in. aluminum honeycomb sheet, 230 in. thick. Face skin are 0.018-in. 7481T6. Core is sealed with coating of 0.016-in. Ubequal Magnesium T-structure extrusion at tailors flange to wings.

• **F-102 nose wheel door.** Core for this part is about 2 in. thick, with a dashed center. Edge of the part is a deep flared 2.5 section. Skin are 2481T6. Overall measurement of the door is about 41 in. x 2 ft.

The honeycomb masking cuts a single and offsets the righting necessary in that type of cut.

F-101 Applications

• **McDonnell F-101 stabilator trailing edge.** This unit is stabilator portion is approximately 8 ft long, 31 ft wide, tapering to about 1 ft in width at the



F-102 WINGTIP is sectioned to show core

outboard end. It is approximately 3 in. deep at widest section.

Construction of the part, a long winglet, has the included angle changing about 4 deg from inboard to outboard. skin requires that the core (1.0 in. hex, 0.02 in. fed) should be cut in a varying angle throughout its entire length.

The 2481T6 skin are bonded to the honeycombs with Nasa's 302 general purpose adhesive, center, instead of the company's 601 adhesive.

Span and end closing doors are formed of 383m-2481 sheet. A solidified doubler bonded between face and core extends from the span to the trailing edge. Core under the doubler is of a different density and has its ribbon running at 90 deg. In this it resembles

of the part's core. These two cores, one bonded, and the other made by Flex 601, Ga., are edge-bonded to each other.

Core spans 4 in. from the trailing edge and an epoxy putty is extended onto the span to provide the part with a bridle edge.

• **F-101 rudder trailing edge.** This unit has no twist in effect is a simple revision of the stabilator.

The component is about 54 ft long, tapering from about 11 ft wide at lower end to about 1 ft at upper end.

Metal-Glass Plastic Structures

Another large honeycomb structure Nasa manufactures for a Convair plane is about 20 ft long, about 5 ft in diameter at the widest point of its



F-102 WING FENCES have skin and web webs attached to wings with T-structure.

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topping shape. It is composed of eight main sections.

Only the nose is solid. This is a 1/2 in. .902-in. aluminum led Meltonian material manufactured by Nansen Reins & Casting Co., and selected because of the extreme compound curvature of the sections. It is bonded to Nansen's phenolic impregnated Fibreglas Coating with the company's 1122 adhesive.

These Condon doors are 610 in. high, except at the periphery of the individual sections and at access doors, where the sandwich structure is replaced by 1-in. cold Condon edging.

The upper sections are bonded and riveted together.

Converted Millers Speed Output Of North American F-100 Wings



CONVERSION OF 1000 WINGS to jetisonable form cost money compared with procurement of new tool. Millers will make outrageously different F-100 wing skins.

By Henry Leifer

Albion—Conversion of a 33 year-old, 100,000-lb. jet plane to a modern, lightened skin canter for jettisoning in flight, instead of aircraft wing sections, has not been completed here by Sunbeam Machine Tool Corp. for North American Aviation, Inc., yet.

The two crew canisters in pretty much the form of can straps, in operation at NAA's Langley, Calif., plant, are owned by both jet planes bought by North American from government supply for modification. NAA engineers himself the jet plane is in operation and continued the article was in limbo.

The crew is perhaps justified to consider that of area equivalent to do a complete job, something like 1000 sq. in.

And because of the aircraft's weight is the heaviest, both planes, the conversion can prove useful to any number of the same type, too. Chester Mueller of NAA's Industrial Engineering Dept., who is in charge of the conversion project,

The skin canter is set up for an ultrasonic cutting of ultralite, reinforced upper and lower skin for the F-100 Super Sabre. In accordance with Sunbeam's plan for North America, right

hand upper and lower sections were cut separately on a little under 7 hours each. It produced simultaneously, the four per panel would be cut at half. Sunbeam's world manager, Pat Besse, gives the machine's average ultrasonic cutting speed at about 70 in./min. However, Mueller says that NAA will not do more than the machine's ability, giving a lead in permanent formation at 1000 sq. in.

With ultrasonic the machine can be adapted to other jobs. Using the same checks it can produce for 8-1000 leading edge patch insulation coats. It will accept 11-in. 708E sheet metal plate 1/8 in. wide by 25 ft. long, and can be adjusted to make thicker plate. The machine itself is 12 ft. high by 25 ft. wide by 30 ft. long.

The 600-lb. cutting heads take the place of the single point tooling on the plane. Both sections. The carbide-tipped cutter on 2 in. wide and 14 in. long. Mounted on the machine, some of the machine, then runs at 1500 rpm, removing material at a rate up to 210 cu. in./min.

Laminated cutting tools vary from 20 to 150 in./min.; transverse feed set

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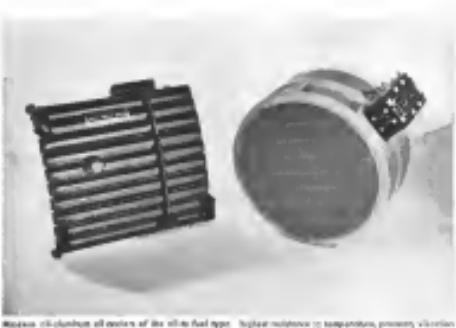


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Marine oil-cooling coil consists of the ultimate type. (Left) uses the oil-to-air type. (Right) employ of forced air-cooling for maximum strength-to-weight ratio, and wear.

Marine oil-cooling coil consists of the ultimate type. (Left) uses the oil-to-air type. (Right) employ of forced air-cooling for maximum strength-to-weight ratio, and wear.



Bottom left: a reheat coil is typical of a heat exchanger for marine applications of high-temperature, pressure oil-cooled compressors. Bottom right: a typical oil-to-air heat exchanger for aircraft compressors.

Typically, it looks into this field by developing the new, superior hydraulic forming method of producing bellows which today is the standard process throughout the industry.

Handling this metal sections to produce products for the control of heat proved simplest, basic experience to tool in Clifford's entry into the ultimate field.

The deep drawing and extrusion process attracted the attention of the armed services and aircraft manufacturers. Two days and Clifford was able to produce copper tubes for the manufacture of several oil coolers and coolant heat exchangers.

Associated with the field, it was long before Clifford's metallurgical background generated an area of interest in aircraft engine lubrication systems. The deep drawing method of fabricating the tubes as needed the metal bellows could follow the contours of the engine, weighing only 100 lbs per cu. in. With oil pressures increasing steadily upward in the newer engines, the situation was ripe for the introduction of a better design of oil cooler.

For years of metallurgical research at Clifford had resulted in a unique, precision method of forming aluminum sections. Considering its earlier development in deep drawing and extrusion of thin tubing, Clifford was well prepared and positioned for the first application of cooler and coolant problems.

The new and weighed only one-third as much as the previous designs and had a life cycle twice as long for further service economy. The air service gives them outstanding approval and Clifford has itself in the forefront of a new field.

First to see the new aluminum oil coolers and coolant indicators was the U.S. Air Force, which has since quickly followed. At the start of 1948, Clifford was the sole producer of all sizes of modern, sleek products which products have been copied around the world.

Clifford's background since the company's inception in 1926 was in the manufacture of thin-walled metallic sections, and this gave an advantage



Bottom left: a reheat coil is typical of a heat exchanger for aircraft compressors of high-temperature, pressure oil-cooled compressors.

in deep drawing and extrusion along after the war required on oil cooling devices. Oil coolers usually consist of a bellows, which is often overlaid, but with thermal. Clifford's contract to produce the J35-C, Clifford was asked to design a new oil cooler.

A completely new concept of oil cooling was suggested by Clifford. Bellows contained large amounts of fuel at temperatures up to 500° F. for the inside of the heat exchanger, but overlaid on the exterior. With the flow reversed by bypass valves, the lubricating oil is kept at optimum temperature.

The new design, since it did not depend on raw air for cooling, could be used in aircrafts where space was more easily arranged. These and other advantages caused it to be adopted as standard for military jet aircraft. The new design has resulted in a significant weight reduction and the elimination of numerous parts. Furthermore, an extended maintenance period has been obtained, being 100 hours. Clifford is today the only company able to produce these unique all-aluminum, self-repairing oil coolers.

Clifford's oil cooled heat exchangers play an outstandingly important role in helping the company to the front rank of aircraft engine manufacturers. The ability to eliminate auxiliary conditions with great economy, gives the need for the time consuming and costly design of a separate air-cooled heat exchanger. The vast array of sizes to permit rapid transition of thermodynamic theory into practical design, without the need for a redesign of pilot controls.

In few companies is there such a direct liaison between engineering, design and production as can be found at Clifford.

New developments, still under military or proprietary wraps, include a new heat exchanger which, in conjunction with enclosed ducts in aircraft heat exchangers, and the unique ability to position, fabricate and braze thin metal sections, has been found to be largely responsible for its present leadership in aircraft heat exchanger design.

For further information, write to Clifford Manufacturing Company, 1800 Eighth St., Boston, Mass. Division of Standard Thermite Corporation, 1000 New York Avenue, Chicago, San Angelo and Franklin, Texas.



Opposite, top: simplified design of liquid-type oil cooler for the J35-C aircraft. (Left) shows reheat coil; (right) original design planned by Clifford. Greatest weight and size reduction, weight reduced 17%, and a stronger, ultimate, efficient heatexchanger achieved.



A great reduction in weight and bulk is achieved.

Airflow involves a special oil cooler for afterburners which automatically cuts in and out with the operation of the afterburner.

Newest oil cooling system for jet makes use of which allows cooling continuous. When the first cool air is used to cool the engine, the second, more massive valves cut in to cool the air type cooling.

Integrating part especially difficult problem. Clifford has designed from horizontal to vertical flight — or to hovering — makes their oil cooling design highly variable. Clifford has developed a unique solution to these problems. One or more nozzle end placed on an oblique angle exhaust duct is used to induce a flow of air into the system. The nozzle end is a probe placed in the air stream, but having in its nose fan driven by a fluid motor. The probe then directs the air stream to the position of the jet through the use of thin-walled tubes.

Electrical switches and various sensors are used to control the system as required. The company is also deep into nuclear energy heat exchange involving the handling of nuclear materials. Clifford has developed a unique method of sealing in aircraft heat exchangers.

For further information, write to Clifford Manufacturing Company, 1800 Eighth St., Boston, Mass. Division of Standard Thermite Corporation, 1000 New York Avenue, Chicago, San Angelo and Franklin, Texas.



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Left: simplified oil temperature regulating valves are designed and manufactured by Clifford for all oil cooler applications.



Opposite, left: simplified oil temperature regulating valves are designed and manufactured by Clifford for all oil cooler applications.

Progress In Oil Coolers . . .

Based on unique, proprietary processes for producing and braze thin metal sections, plus the largest wind tunnel laboratory facility of its kind, the Clifford Company has pioneered the major developments in this field since 1940.

As flight conditions become increasingly severe with the drive for higher speeds over greater altitude ranges, temperature regulation of engine lubricating oil becomes a critical factor in aircraft capabilities. Employing factor in aircraft capabilities. The relatively simple requirements



Front gas welding of reciprocating engine oil cooler

Another in its exclusive proprietary process for braze thin metal sections and heat exchangers is now available for other applications.

Third is Clifford's wind tunnel laboratory — the largest, most completely equipped in the world.

Clifford's background since the company's inception in 1926 was in the manufacture of thin-walled metallic sections, and this gave an advantage



Lockheed's famous P-38 is among the first military aircraft to use Clifford's newly developed aluminum oil-coolers and sealed nozzles.

Advertisement

BUSINESS FLYING

Beech Should Reach Jet Decision By Fall

By Ernest J. Balkin

Beech Aircraft Corp. could roll out the first U.S. production version of the twin-jet Morane-Sudron MS 760 business jet in late 1981, says Jack Gots, vice presidential manager. The air 490 mph, fast jet, executive plane will cost approximately \$100,000, according to Beech officials.

Indications are that the company should be able to start a division in Vib'Yrol production by the fall, hand in current reaction during the second week U.S. and Canadian trial which began early this month in New York. Beech has a working arrangement with the French aircraft builder to evaluate the Western Hemisphere market and an option to build the aircraft (AW May 9 p. 22).

Civilian Market

Contrary to a report that Beech would expect more than 100 commercial deliveries before it would roll the aircraft into production, a company official told *Aerospace Week* that the builder such a division would be made only if the need of considerable future market demand, although he declined to discuss numbers. He and the company feel it is going to take a few field as this category of plane for some three or four years and could go on the basis of a gradual buildup.

During this period, Beech expects it would take advantage of the considerable growth factor it sees in the design. The current aircraft is powered by two Turbomeca Marboré 51 rated at approximately 580 lb. thrust each. The



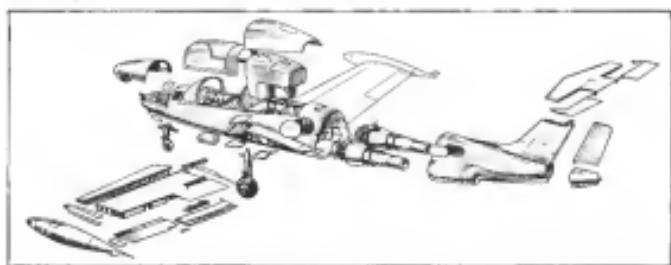
ABOUT \$100,000 is price Beech is tentatively quoting for its version of twin-jet MS 760.

Beech aircraft would be powered by Concorde's Pratt & Whitney JT10D-300 in thrust and the U.S. aircraft builder reportedly has improved versions in the works developing 1,200-lb.-thrust. These high-temperature, afterburner aircraft would find no competition over present French engines.

The French government has granted the MS 760 commercial approval. The U.S. does not yet recognize French-type certification, although initial contact has been made by the two govern-

ments on this matter. Civil Aviation Administration says that such arrangements take a minimum of a year and a half.

Beech states that the civilian market will get first priority in its demonstration. Thus New York, the market includes Washington, D. C., where U. S. and foreign military personnel will be invited to inspect the airplane, then Atlanta, Houston, Wichita, Denver, Allentown, Los Angeles, San Francisco, Seattle, Detroit and Chicago.



ACCESSIBILITY IS KEY FEATURE of French-designed jet. Ten MS 760s have completely disassembled plane in 75 min., just 11 together in 50 min., after which it went through a flight demonstration. Passengers can change both engines in about 90 min.

The test will radiate from this stop to neighboring cities.

Canadian plans of the tour will cover Montreal and Toronto for a press showing and Ottawa and Toronto for visiting by Royal Canadian Air Force. Thus the tour will visit 10 Canadian cities for approximately 250 hr. of flight demonstration (AW May 21 p. 9).

U.S. Navy has exhibited considerable interest in the plane. Last year Beech officials visited Paris. Following the SBAC show in Farnborough and was told by high-ranking Navy personnel that the MS 760 is "worth considering" and were urged to look at it.

Beech has no difficulty in getting the airplane to civilian customers if Navy should place orders for a combat trainer version. The company points out that it has been undergoing military and civilian production of 20 MS 760s since the mid-1970s. Thus, no, the only true a problem arises when the Korean emergency when Beech shipped 76 in Korean civilian output and diverted this production to the Army.

Flight Characteristics

During a press demonstration at Wrentham Executive Airport, the plane was able to 30 metric flights with Jim Gligor, Monroe-Sudron's chief pilot, and Alice Ranson, of Beech Aircraft's sales department, a civilian private pilot who is learning how to handle the plane.

Starting the airplane seems to be simple. The fuel cock is fully depressed and igniter button is pressed. When the tachometer goes 5,000 rpm, the status is released letting either fuel injection and the combustion chamber and intake mass flow metering system take over. Propulsion is expected for the other one.

Rohrbach is mostly trained on half a day up to six for takeoff, other mass at control. Ranson told *Aerospace Week* that he generally uses about 77-deg flap for takeoff. Canopy is closed and a lever on the right side is pressed forward to inflate the canopy seals, due to pressurization.

Takes off is about 32,600 rpm. The track is about back to approximately 100 ft and the airplane leaves the ground at about 47,000 ft. The aircraft is leveled and slowly begins a climb of about 100 ft and flap are retracted at 10% lift. Fully loaded the MS 760's best climb speed from sea level is 230 ft. Normal cruise altitude is 31,000 ft.

Fast management is going to be an important aspect of future jet business plane operation, Ranson points out. The MS 760, for example, burns 90 gal./hr. at Wartski's 410-ft. elevation. Fuel consumption at normal cruise altitude of 21,000 ft is 2.01 gal./nm, giving a range of 740 mi. but at 3,000 ft,

French Variety in Lightplanes



DASSAULT TURBULENT single-engine biplane has 25 hp engine. It weighs 100 lb. and does 90 mph. Two seat Turb., in nose weighs about 1,100 lb. and does 100 mph on 50 hp.



DASSAULT CONDOR twin two-seater weighs 1,000 lb. and can take off at 65 hp. on 90-hp. Continental engine. It has a top speed of 112 mph on 65 hp. Condor's wingspan is 36.2 ft.



FOUGA ET-0-R MAGISTER twin jet tandem training is in production for French Air Forces. Does better than 450 mph on 100-hp. Pratt & Whitney Marboré. Gross weight is 8,100 lb.



FOUGA ET-0-R MAGISTER twin jet tandem training is in production for French Air Forces. Does better than 450 mph on 100-hp. Pratt & Whitney Marboré. Gross weight is 8,100 lb. Like the Dassault above, the Magister is designed for "build yourself" students.

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Kawneer provides quality, economy and delivery again! Last Fall Kawneer started the Cessna T-31 side-by-side cockpit enclosure project and delivered the first unit this Spring. This "on schedule" procedure was possible because Kawneer has formed an integrated "package" of engineering, design and production in the cockpit enclosure field.

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fuel consumption drops to 3.60 gal./hr. and range drops to 990 mi.

The airplane has a critical single-engine performance until stripped down to 185 lb.

During the demonstration MS768 used Shell JP-1, which is short on supply in the U.S., because it has been phased out of jet operations. JP-1 is available in limited quantities in the New York area. Novet fuel guide is Shell kerosene #60 which the petroleum folks are pushing for Capitol Airlines' introduction.

While aloft, Raines cut an engine, leaving it to sputter while he picked up power on the remaining Mariner. Then a couple of minutes later restarted the dead engine. With one engine not only a few degrees and half-reversible.

On the next flight with another pair of passengers, the port engine gave out with some "funny noise" when Raines attempted a roll, so he dove back to the sunset in one engine without difficulty. He said, "Dolittle examined the failed engine at the front base." Major Standard brought the Mariner to the U.S. The engine can be changed in door time in about 30 min.

Preferred dive brakes above and underneath the wings are activated by 2 buttons on the right throttle as a handle on the port side of the cockpit. Pulling them open causes no noticeable nose-pitching.

Best approach speed is approximately 95-100 hr. and touchdown is made at about 85 ft.

PRIVATE LINES

Brock officials see Germany as an important market for U.S. business aircraft. A number of German concerns have been operating executive planes using Swiss registered aircraft and pilots.

Comair expects to sell soon several business plane versions of its 1938-1949-prewar aircraft with additional unpassenger, quiet exhausts, and 5 mph higher. Company feels that there is a current market for at least 10 airplanes.

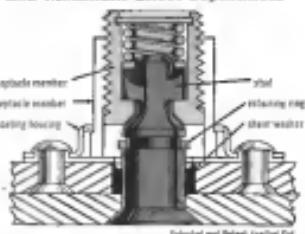
First Bell executive AT-11s copies have been delivered to the president of Columbus, Ga. Gustavo Paultz.

Notred Dame Aircraft Assoc. will administer award of the Werner's American Assoc. annual Bascom Flight Safety Award to first year aeronautics who has made most effective and original and presented safety. Trophy will be given to nominees at NASA's national convention.

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Field-Effect Transistor Raises Semiconductor Frequency Range

By E. M. Bess

The "field-effect" transistor is one of the latest additions to the transistor family.

Although it operates on a principle quite different from that of the point-contact or junction type, it is capable of performing most of the same functions such as amplification or oscillation, and it has the advantages of small size and low power consumption common to the others.

The development of the field-effect transistor is in an early stage, however, it has already been shown that it behaves as predicted by theory and, in particular, that it should eventually be capable of operating at apparently higher frequencies than can the point contact or metal junction types.

Underlying Principle

Although the field-effect transistor is one of the most recent of the transistor family, it can be made into a practical amplifier the underlying principle is quite old as transistors go. The original proposal for the device is illustrated in Figure 1.

As shown, it consists of a thin sheet of conducting material with electrode contacts at each end and a metal plate close to but not in contact with one surface. The other of the two electrodes and the metal plate then form a capacitor. By applying a voltage to the plate, a field is set up which causes the potential of the points of the potential to correctly choose, the field will tend to push the current carriers away from the surface of the material. The net result of this will be a decrease in the total number of carriers in the material and hence an increase in the resistance from end to end of the slab.

If the device is connected as shown in Figure 1, when the key is closed the current through the slab will decrease. It is therefore possible to control the current through the slab by means of the potential on the metal plate and if the dielectric between metal and slab were perfect, this can

The author is engineer in electronic research at Bell Telephone Laboratories. He holds a B.S. in 1945 from Cornell University.

still would require no power. In the event of Figure 1, the current through the slab will flow through a load resistor. Thus when the current changes, the potential of one of the two electrodes will change and a large enough change will be greater than that applied to the metal plate. In other words it would be possible to obtain voltage amplification to the others.

Also when the current in the load changes the power dissipated in a load plug and, since the current power is essentially zero, there would be power amplification.

The principal problem of the induction of the field-effect transistor was to find a suitable material for the slab.

Since the material had to be a conductor, it is obvious that two materials should be used.

Metals, on the other hand, contain such high densities of current carriers (electrons) that it would require an impractically high potential to give an appreciable percentage change in the control current.

Semiconductors, however, have densities of current carriers lying between those of insulation and those of metals and are ideally suited as "field-effect" transistor materials. In 1948, W. Shockley and G. L. Pearson of Bell Telephone Laboratories and government made a significant contribution to that they were able to affect the current through the transistor by means of the potential on the metal plate, but that the control strength was much less than that predicted from a theory of the device. However, this was the first time that the "field-effect" mechanism had been observed.

Loss of Sensitivity

It was proposed by E. Bess that the loss of sensitivity of the device could be attributed to conduction at the surface of the semiconductor slab. At the surface, the concentration of atoms is different from that in the bulk of the material and hence the electrical properties may also be different.

In other, what Bess proposed was that the free surface acted as an electrode since that tended to permit a field from penetrating into the body of the material, thus decreasing the effect of the field on the resistance of the slab. It was during an investigation

of this loss that he proposed that Bess and W. H. Brattain increased the current density to increase the signal voltage. Under these conditions the practice is to be found in the "forward" direction, and it has a low impedance.

It, however, the practice is made negative with respect to the negative, both the electrons and holes are pulled away from the junction, and little or no current flows across the junction. Under these conditions, the junction is said to be biased in the "reverse" direction and it has a high impedance.

Reverse Bias

A good analysis of a p-n junction based on the reverse direction shows that there is a small but constant current flowing in the order of a few microamperes.

This current is independent of the magnitude of the applied bias and is therefore called the "saturation" current. The author further shows that all the voltage drop occurs in a region close to the junction itself. In fact, the electric field is that region is sufficiently high to pull the charged carriers (electrons and holes) out of it.

The region is shown in Figure 2B where the charged carrier concentration is shown as a curve on either side of the junction. Such a region is called a "space-charge" region. Since it contains no current carriers, it can not support conduction and will thus far, act like an insulator. However, this region is bounded by conducting regions of p- and n-type conductivity.

A p-n junction specimen may be defined as a piece of ingot-grown semiconductor combining two regions having a type conductivity, and the boundary between the two regions at which the type of conductivity changes is referred to as the "pn junction."

Such a pn junction is shown in Figure 2B, where the distribution of current carriers (holes and electrons) are represented schematically in the plan and cross sections. If the p-side is made positive with respect to the n-side then electrons will be pulled across the junction from the n to the p-region, while holes will move in the opposite direction. Because of the



Fig. 1 Field-effect transistor using a p-n junction with a resistor load. The body of the transistor is a slab of material which is applied between the p and n-type materials in a portion of space charge, creating a region within the body of the type material that will not conduct due to low free charge concentration.

nature of these charges, a current flows, and the current increases with increasing applied voltage. Under these conditions the practice is to be found in the "forward" direction, and it has a low impedance.

It, however, the practice is made negative with respect to the negative, both the electrons and holes are pulled away from the junction, and little or no current flows across the junction. Under these conditions, the junction is said to be biased in the "reverse" direction and it has a high impedance.



ASSEMBLING transistors in special jig

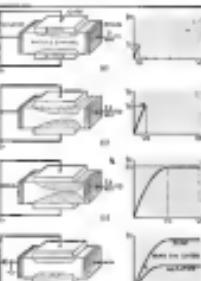


Fig. 3 Schematic diagrams of a field-effect transistor, showing the shape of the space-charge region and current-voltage characteristics for (a) zero gate voltage and small drain voltage, (b) higher drain voltage, and (c) pinch-off condition for zero gate voltage.

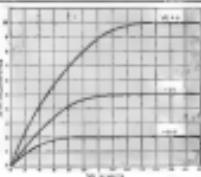
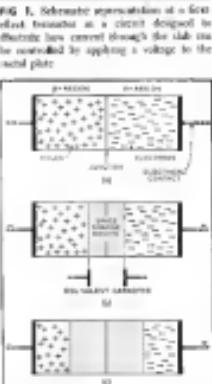
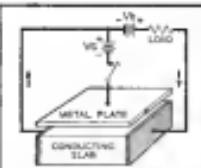


Fig. 5 Thorough characteristic curve for field-effect transistor with gate voltage 0.0001 volt.





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list includes:

• Computer Development at the National
Bureau of Standards involving the design
and development of a computer system for
the Defense Department. Cost: \$10 million. Order
from Government Publishing Office, Washington, D. C.

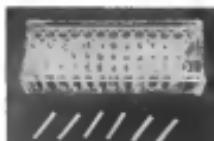
• Various aerospace systems, including:
aerospace applications engineering data, hot
body temperature control system, etc. Cost: \$45
million. Order from: Washington, D. C.

• Protective technologies, both thermal and
electromagnetic, for aircraft, vehicles, and
space vehicles. Cost: \$60 million. Order from:
Washington, D. C.

FILTER CENTER

► Shock-Safe Digital Computer—an
aerospace "catalyst" system, digital computer
capable of providing housing,
interior and exterior protection for electronic
systems, can be built in a size no larger
than a shoebox. Lufthansa engineers believe,
as a result of significant new
computer techniques and components
which the firm has developed. One
of these is a complete flip-flop circuit
which will fit into a thumbtack.

► Do-It-Yourself Radios Kit—New La
for lab and development are emission
type receivers—10 each of 49 different
MHz R-114 values (ranging from 100



000 to 1,000,000 to 1000. Reference
Kit RNP-12 calls for \$49.95. Manufacturer:
Hansen Electronics, 7117 South
Santa Monica Blvd., Los Angeles 46,
Calif.

► New HF Transistor—New "back
back" process developed by General
Electric for casting semiconductor
crystal enables transistor to operate
at frequencies five times higher than
ordinary transistors. (5000) Growth
depends on new semiconductor
process, GE says. Melthick process cuts
transistor cycle time from 28 minutes
(in previous integrated process) to
something less than a second. The
process grows a porous coating of silicon
particles in the thin layer of germanium
or silicon crystals. The number of
impurities which migrate from paper
binder into silicon layer is related to
about one-tenth the previous figure,
GE says.

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first essential in aircraft electronics

Electro-contact electronic equipment is frequently installed in close proximity to the aircraft engine. This equipment must be reliable and capable of operating in association with complete reliability under extreme applied conditions. However, the degree of reliability required depends largely upon the attention given to detail in applying these basic design principles to every phase of equipment development:

1. Incorporation of inherently simple circuitry to accomplish desired mutual functions
2. Required design of redundant circuits
3. Selection of components based upon extensive environmental and life tests
4. Operation of all components well below their maximum ratings
5. Adequate performance tests of insulation units under extreme operating conditions

State-of-the-art in these principles has resulted in an insulation system reliability of 99.999 percent electronic equipment. We believe our years of concentrated research, development and tests devoted exclusively to automatic control systems for jet engines can be of real value in solving your control problems. Our engineering counsel and extensive manufacturing and test facilities are at your service. We welcome your inquiry.

TEMPERATURE CONTROL AMPLIFIER (Illustrated above). Modulates engine bleed air temperature of a ramjet engine to maintain a constant ramjet exit temperature. Temperature is derived from thermocouples. Output controls a servo which regulates fuel/nozzle power to the exhaust nozzle positioning mechanism.

TEST SPECIFICATIONS. MIL-E-5009A altitude, altitude gain, seat and seat, humidity control, altitude, heat, MIL-E-5012A, test force. **MIL-E-5017** thermal insulation. **MIL-E-5018** term insulation.

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AVIATION CALENDAR

July 3—Air Force Arms, second annual
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at the National Guard pilot's
League meets at Dallas.

July 4—Service annual Western New York
Air Show and Races, Oneida Airport,
Oneida, N.Y.

July 14—International Aviation Exposition,
Detroit Wayne County Airport, Detroit.

July 26—National Air Races, 4th Western Trans-

Continental Air Races, Livermore Field
to Springfield, Mass.

July 21—Twentieth Annual Seafaring
Contest, Hemet 993 Elkhorn, N.Y.

July 27—Officer of Naval Research and Res-

ervation Board, 10th annual national
aviation radio contest, selected naval and
military bases.

July 28—National Electronics Show, New York.

July 31—Special summer program on
Aeronautics of Unimate Corp., Marin
County Institute of Technology, San
Rafael.

July 12-14—Western Plant Maintenance and
Engineering Show, produced by Chapman
and Polensky, San Pedro Auditorium, San
Angels.

July 16-18—Philadelphia Club's Council
of Engineers, annual meeting, Philadelphia
Globe-Trotter Hotel, Philadelphia.

July 27-29—Rotary International Congress
Rotterdam, The Netherlands.

Aug. 8-9—Experimental Aircraft Assn., third
annual Fly-In and Convention, Cessna
World Airport, Wichita, Kansas.

Aug. 8-10—National and International
Society of Automotive Engineers, annual
National Technical Exposition, Board of
Air Transportation Meeting, Olympic Hotel,
Seattle.

Aug. 13-14—Air Force Arms, Convocation
and Aerospace Planning, San Francisco.

Aug. 19-21—Society of Automotive Engi-

neers, West Coast Golden Anniversary
Meeting, Hotel Statler, Portland, Ore.

Aug. 22-23—Symposium on Electronics in
Automotive Production sponsored by State
Reed Research Institute and the National
Electronics Council, Hotel Statler, New York.

Aug. 29-31—Western Electronics Show and
Convention (WECON), Civic Auditorium
and Convention Hotel, San Francisco.

Aug. 24-26—International Aviation Confer-
ence, 10th annual meeting, Hotel Americana,
Long Island City, New York.

Sept. 3-4—Troyer's annual National Aircraft
Show, Philadelphia International Airport.

Sept. 3-6—Automobile Drivers & Pilots Assn.,
eighth annual Roadside Flight Meet,
New York to Bismarck.

Sept. 12-16—Instrument Society of America,
10th annual Conference, and Exhibit,
Sheraton-Broadway Hotel and Auditorium,
Los Angeles.

Sept. 17—Institute of Radio Engineers,
Symposium on Automation, Gothic Rep-
ublik, New York.

Sept. 24-29—American Institute of Electrical
Engineers and Institute of Radio Engi-

neers, 19th International Electronics Con-

ference, Park Sherman Hotel, Detroit.

Oct. 13-15—Eleventh annual National Elec-

tronics Conference, Hotel Sherman, Chi-

cago.

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many service problems. For example, they can
give you complete information on the product
described on the next two pages.



TED BOTTOMA



GINO HEADMAN

New silicones that run clean at extreme speeds and temperatures



Shown here is Dr. G. C. Ginner, the Westinghouse scientist who developed the lubricant. The sample of
the new silicone he is pouring was heated to 480°F. for
over 100 hours, yet it remains clear. The conventional
lubricant at the left shows a large degree of sludge
formation after only four hours at 480°F. JMH/1A

FOR MORE INFORMATION ON WHAT THIS NEW
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Out of the Westinghouse Materials Engineering Laboratories and the Aviation Gas-Turbine Division has come a new silicone lubricant so good it actually isn't needed for anything but the fastest and most powerful jet engines. This new oil eliminates sludge. It stays clean on bearings and gears at tremendous pressures and temperatures.

Present oils are adequate for many of today's jet applications. But engineers look to the new lubricant to solve problems that will exist at the extreme speeds and high temperatures already forecast for the future. The new oil holds great promise for applications in jet-powered missiles for military use.

The silicone lubricant was perfected by changing the structure of the silicone molecule. The new oil forms a close-packed layer of protective lubrication. After passing every laboratory test and with flying colors, the oil was tested in jet engines. There was a complete absence of sludge at the completion of the test.

This new development is typical of the kind of diversified, company-wide attention just problems get when you give them to AGT. This ability to put the right men to work on the job and to give them the right facilities is one more Westinghouse means of helping you bring tomorrow's aircraft . . . One Step Closer.

Dr. Gordon C. Garner, Westinghouse materials engineer, and AGT's George Townsend co-operated in developing the new silicone. Adapting it to jet engine use is an example of corporate co-operative effort available to you through your local Westinghouse AGT sales engineer.

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- Oil bath compressor
- Weight is 450 lbs. maximum



MODEL E AP-150 TYPE 205

- Maximum system pressure of 22 PSIA
- Motor: 1/2 HP—1000 RPM, 208 V, 3 phase
- Compressor: 1/2 HP—2000 RPM, 208 V, 3 phase
- Current draw is 2.6 amperes maximum under normal operating conditions
- Oil bath compressor
- Weight is 450 lbs. maximum



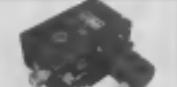
MODEL E AP-1000 TYPE 300

- Maximum system pressure of 22 PSIA
- Motor: 1/2 HP—1000 RPM, 208 V, 3 phase
- Compressor: 1/2 HP—2000 RPM, 208 V, 3 phase
- Current draw is 2.6 amperes maximum under normal operating conditions
- Oil bath compressor
- Weight is 1500 lbs. maximum



MODEL E AP-3000 TYPE 300

- Maximum system pressure of 22 PSIA
- Motor: 1/2 HP—1000 RPM, 208 V, 3 phase
- Compressor: 1/2 HP—2000 RPM, 208 V, 3 phase
- Current draw is 5.2 amperes maximum under normal operating conditions
- Oil bath compressor
- Weight is 18,454 lbs. maximum



MODEL E AP-3000 TYPE 300

- Maximum system pressure of 22 PSIA
- Motor: 1/2 HP—1000 RPM, 208 V, 3 phase
- Compressor: 1/2 HP—2000 RPM, 208 V, 3 phase
- Current draw is 5.2 amperes maximum under normal operating conditions
- Oil bath compressor
- Weight is 18,454 lbs. maximum



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It has provision for eight individual outputs and crew interphone service. Any combination of channel and telephone can be handled by pilot or co-pilot without affecting hearing volumes of the other. Interlock circuit allows bypassing the switch assembly in event of failure.

AI-125 is contained in a folded silicon case 4x12x6 in. Weight is 7 lbs. List price is \$775.

Aviation Accessories, P.O. Box 4173, 1615 North Main, Fort Worth 6, Tex.



Jeep Carryall Hauls 2,000 Lb.

New Jerry cart, capable of hauling 2,000 lbs of annual express, freight and usable as a tow vehicle, has removable sides to permit rear bulk-life loading. The unit was developed from a standard Kimes Willys truck chassis. Wheel base is extended from 90 in. to 95 in.

United Air Lines participated in the design and has placed 10 of the vehicles in service at various airports.

H. W. Allen Jr. Co., San Carlos, Calif.

Transistors in Amplifier

Transistorized booster amplifier, designed to meet military and civil space requirements, operates smoothly from the 20s, i.e., quiet, requiring no volume control. This means that the only weight added in the 150-watt amplifier unit is the transistor.

Model 19102 provides output of 10 w. from a 1-w. source. Input and output impedances are 100 ohms. The operating frequency is 1.5 to 1000 Mc. The amplifier has 100,000 cycles. It is reported. Tested circuit boards are and in production long life. Unit measures 11x10x11.1 in.

Levi, Inc., Lea-Cul Division, 3471 S. Brady Dr., Santa Monica, Calif.

JOURNAL OF WIRE, June 27, 1959



Weight-saving 450°F FLUOROFLEX-T "plumbing" in the MARTIN SeaMaster and its 4 engines

The world's first multi-jet attack seaplane uses the world's first Teflon-compound hose.

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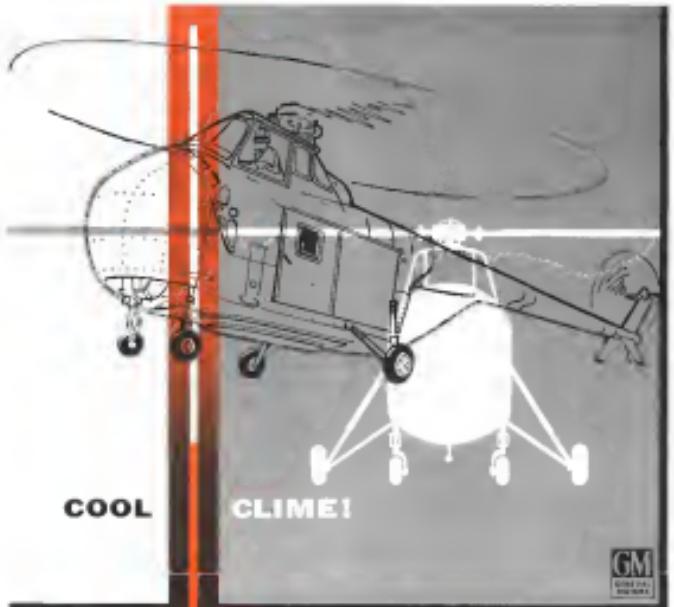
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and right wing. All surfaces tested that had been in contact with ground impact. Considerable movement of the structure indicated no evidence of fire in flight, no failure or malfunction of control pins in the impact.

Dimensional and geometric data of the two blades showed that the uppermost tip of the left propeller was 25 degrees and the right propeller blade angle was 30 degrees, the latter being near the full feathered position. There were no indications of mechanical failure or malfunction of the two propellers or their control assemblies.

Dimensionally, the right engine assembly and the nose section of the aircraft were severely paled and twisted from impact and shearing of the right propeller shaft. The right engine and the nose landing gear were unaffected. The power section was severely damaged with all piston rods lodged in the heads of the cylinders or broken up and found in the power section.

Dimensionally, the left engine assembly and the right engine section, and valves had been warped at above normal temperatures. No 8 cylinder exhaust valve was extremely bound, the pale and bent heat valve stem and whitened valve spring gave evidence of extreme heat.

An air test of the carburetor revealed an abnormal lean mixture in the case for the left engine. Pilots and maintenance men had reported the engines stalled it had been necessary to use auxiliary fuel to start the engines again. A portion of the left carburetor was revealed a normal fuel line. Dimensionally of the left carburetor AVFC (constant mixture control) revealed that the nozzle was extended beyond its normal position causing a lean mixture. A digital dial caliper reading on top of the AVFC bellows was noted.

The snout and engine logs were destroyed by fire. The surplus engine installed in sufficient date of N 8201H were not supplied with logs when they were given. The logs were not made of metal and the engine was not supplied with logs and cannot be determined. The engine was tagged as one heat valve stuck closed, after a partial shutdown and inspection was made following this position. Since then the left and right engines of 479 and 470 hours respectively, at the time of the accident.

The gross weight of N 8201H at takeoff has been computed at 17,859 lb., which is 790 lb. more than the maximum allowable weight of 17,069 lb. Post mortem testing the flight in Gloucester reduced the gross weight approximately 920 lb.

Capt. MacKenzie had found apparent control lock when applied on the rudder control and was able to get in pilot on pressurized the controls and pilot control in the cockpit. The aircraft had been flying at 10,000 feet. He stated as did the factory log in computed of N 8201H, that they had simulated single-engine flight on several occasions. He could also confirm that he was either pilot or copilot on Lockheed aircraft and had been flying the Lockheed Electra and the Lockheed Constellation in the North Atlantic in World War II. It was testified that Capt. Welch had two short periods of employment in a co-

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• SAFETY

in the condition of the part at a time prior to purchase of the engine.

The condition of the left engine is considered to be dimensionally indistinct that there was possible to the pilot loss that normal power was available. Although the right engine was not designed to deliver power for each power setting, it is believed that there was sufficient power remaining in that flight could have been maintained had the pilot used accepted single-engine procedures.

Had the pilot made a different turn at the time of the engine failure the residual thrust distance might have enabled the aircraft to have safely reached Shady Field, despite the condition of the right engine.

At the time of the turn of altitude was unacceptably low during the initial part of the emergency there was still sufficient time and altitude to establish normal single-engine performance. This was known due to the fact that when the maximum altitude was attained the aircraft was still at 2,500 feet and descending at only 309 ft/min. feet per minute. This rate of descent continued down to 200 feet above the ground at which time the indicated speed was only 95 mph.

FINDINGS

On the basis of all available evidence the Board finds that:

1. The crew and the aircraft were properly certificated.
2. There was no fire prior to impact.
3. Weather was not a factor in the accident.
4. A structural failure occurred in the power section of the right engine that accounted for loss of the right propeller.
5. Failure of the right engine performance was related to loss of thrust.
6. Failure of the right engine on the left engine reflected very low remaining available power as sufficient to single-engine performance.

PROBABLY CAUSE

The Board determines that the probable cause of this accident was that the failure of the right engine, accepting single-engine power, was the following, as indicated in the aircraft being struck and striking the ground.

By the Civil Aeronautics Board,
Ron Miller
Peter F. Adams
John Lee
Clara George
Homer D. Dooley

Israelis Planning Match 1.5-4.5 Tunnel

Tel-Aviv's high-speed wind tunnel is to be purchased by Technion, the Israel Institute of Technology at Haifa, for aerodynamic studies in its Department of Aeronautical Engineering.

Speed range of the tunnel will be from Mach 1.5 to 4.5. High-speed photographic equipment will be installed.

The Department is headed by Prof. Salomon Goldstein, a well-known British aerodynamicist.



Two Aerojet-General high-thrust, short-duration solid propellant rocket powerplants boost the Navy's famed REGULUS missile off on its mission.

Built by Convair-Vought, the REGULUS is one of a growing number of missile missiles for defensive or offensive applications.

This booster and its informer, the ROULLUS, prove reliability, productivity and low cost make it another example of Aerojet-General's unparalleled experience in development and production of rocket powerplants.

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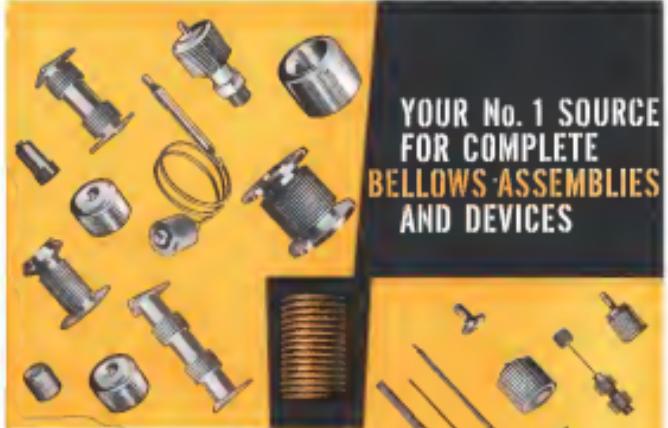
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AIR TRANSPORT

Seaboard Plans Atlantic Cargo Schedule

By Gordon Conley

New York—Seaboard & Western Airlines plans to operate a scheduled cargo service between the United States and Europe when the North Atlantic air route committee becomes effective next August. The new flights will include cargo connection among scheduled intra-American airlines, adding about \$44,000 to a total to the total available freight capacity.

President Eisenhower approved Seaboard's freight certificate June 16, capping S & W's eight-year fight for a scheduled operation. His decision, made in line with recommendations submitted by Civil Aeronautics Board 13 months ago, cleared away the last of major congressional air transport cargo routing action at the White House.

The certificate authorized Seaboard to carry cargo from New York, Philadelphia and Baltimore to Newfoundland and Ireland. Beyond Ireland, the freight line can fly to West Germany or Britain, the Netherlands and Belgium and to Switzerland with stops in France. The service will receive no government subsidies.

60-Day Wait

S & W must wait 60 days before it can commence scheduled North Atlantic flights. The interim period will give the carrier time to protect cargo interests from transatlantic air route committee "interference." At the same time, Pan American World Airways, Trans World Airlines, American National Airlines and American-American Airlines—a chance to try and reprise the case.

Last week, spokesmen for the three major airlines made these comments:

- **TWA**—"I don't know for a fact whether we'll seek a petition for route extension. It's an unusual operation that the company's officials now say that we're more interested in the Pacific, and it's quite possible we'll let the Pan-American division go by the board."

"I would think there's no doubt about TWA and Pan American performing for recompensation."

■ **Pan American**—"It's been a blow, but we'll probably wait and see what they can come up with."

■ **TWA**—"We haven't decided what to do."

The 60-day interim period also will give the Board time to examine bilateral agreements with countries on

Seaboard's routes and to act on the carrier's proposed plan for operating on these routes.

S & W wants to start with no more than a week between New York and Shannon, branching from there to London, Amsterdam, Brussels and Frankfurt on one leg and to Paris and Zurich on the other.

Other flights can be inaugurated from Philadelphia and Baltimore. Seaboard must open offices in the two cities and decide the frequency needed.

Noland's Prediction

On another, in the new operator's future, Executive Vice President Arthur V. Noland said: "I predict our cargo tonnage that we will increase our present volume by at least 30-50% during the three years."

Seaboard plans to buy new transports for its transatlantic fleet in the near future, and Noland indicated the carrier may go to Lockheed Aircraft Corp. for its new 104-81 Super Constellation. It now operates four 104-90 Super Const-

stars and two DC-4s. Maximum payload for each S & W Super Const. is 17,000 lb. and 17,000 lb. for the DC-4.

Airfreight Pact

To work out a possible compensation agreement, Noland met last week with Airfreight Atlantic President John V. Nishfield. The British carrier operates the only other scheduled all-cargo service between the United States and Europe (AV Week 6, p. 128).

Personally, I think Seaboard's entry is a healthy sign, Nishfield said. "What I like in it is Seaboard is in join IATA (International Air Transport Assn.) and operates as a competing partner."

"Working together we could develop a sensible tariff structure and strengthen our whole North Atlantic airfreight operation. We'll have a more intense interest. It'll be the start of a new cargo currency in IATA."

But if they stay out, all members will declare open war and take action against Seaboard collectively. I earnestly

Why CAB Reversed Itself in Cargo Case

Washington, D. C.—Two major factors entered into Civil Aeronautics Board's recent decision to recommend a trans-Atlantic cargo certificate for Seaboard & Western Airlines, after ruling in 1957 that there was no need for the service. These were:

- Recent equipment developments, including the DC-8 and Super Constellation, makes the cargo operation commercially feasible while DC-4 cargo operations are not.
- Support of the Defense Department in favor of the cargo operation in the proposed route.

The decision's text made these points:

- Advantages of the certified carrier, necessarily requiring the new carrier to exert diligent effort and promotional and developmental ingenuity in the creation of new markets for its products and in the promotion of new service offerings to promote cargo markets. At the same time, the existing certificate carriers will necessarily be engaged in similar efforts.
- Out of the total cargo tonnage effort, we expect the rapid expansion of the new Atlantic cargo carrier will be in the passenger service and an increased air freight for the existing transatlantic carriers. Thus a new air cargo service will help rather than hurt air carriers United States trans-Atlantic carriers and will also ease cargo the industry's support required for these carriers.

"We are concerned that the new trans-Atlantic cargo service have been authorized will derive its principal support from cargo patronage in not yet separated by the certified carriers and not from revenues diverted from the certified carriers."

"The other indication is that the service and development of the cargo market is in such current (PAA and TWA) of secondary or incidental concern as compared to their passenger service. So long as this is the case, the public interest requires that the United States be represented in this important field by a carrier that will have a proper interest focused in the development. Certification of a new carrier will give greater assurance of continued developmental effort and operation of trans-Atlantic services. For such a carrier's only existence depends in the operation, and therefore there is every incentive to maintain the service."



3 REASONS WHY IT'S for Aircraft and

IN CHARGE OF SYSTEMS DEVELOPMENT at General Mills are Dr. Carl L. Kieber (left) who was a top man on German radar and V2 technology and also spent five years at Wright Air Development Center, and Dr. Howard H. Deller (right) who came to General Mills via Cal Tech. They are joined by General Mills director of R & D, W. L. Monroe. Looking on is Dr. Clois Beaman, director of Engineering Research and Development, a national figure in electronics because of his work for the National Bureau of Standards, Standard Research, General Mills, and the Department of Defense.



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Traffic up 55%

in the first month of Viscount service on New York-Toronto route



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wouldn't want to fight 11 airlines." Norden said his airline probably will join IATA and work side by side with British competitors.

"Certain communities can stand competition," he said. "We compete and if we can carry passengers at different speeds, returns on the higher-speed goods will make it possible for us to cover other communities that otherwise would not move by air."

Lockheed Offers New Airfreighter

Lockheed Aircraft Corp. is coming out with an all-cargo version of its 1049C Super Constellation. First order for the 51-passenger 1049H, possibly will be placed by Southeast Airlines. Another 10 will enter to buy the 1049D airframe.

Other orders are expected from Shok Airways and Flying Tiger Line. Shok is the better project. It leased a 1049D from Southeast during the first part of this year and paid additional cash for its performance.

Low Operating Cost

In its 1049H sales campaign, Lockheed is pushing an airframe gotten by cost-conscious airfreight carriers. "It will move more tonnage with greater and more constant economic rates available," the builder claims. "And it will do the job at the lowest cost per ton-mile in the world."

The company quotes these direct operating costs for trans-Atlantic flights with a four-man crew, full equipment configuration, a three-hour fuel reserve and repeat average yearly winds of 24 mph.

• New York-Shannon, 9.1 cents per ton-mile with a 23,300-lb payload.

On ton-mile, Norden reported Southeast would push its theory of specific rates for certain communities.

"Certain communities can stand competition," he said. "We compete and if we can carry passengers at different speeds, returns on the higher-speed goods will make it possible for us to cover other communities that otherwise would not move by air."

- All-magnesium floor flat can carry loads of 1,300 lb per linear foot or 100 lbs per square foot.
- Four forward cargo bays arranged in a stepped fashion provide for loading loads up to 1,000 lb in any direction, plus no restriction on the angle of pull.
- Optimum equipment such as weather surveillance radar and wingtip fuel tanks.

With its new certificate due accelerated trans-Atlantic cargo flights, Southeast & Western Airlines will be able to attract financial backing for expansion.

Customer Testimonials

"The Super Constellation is the best one aircraft long-haul airfreighter now available," said Arthur V. Norden, Southeast's executive vice president. "The Douglas DC-8 is inferior to the 1049D only on short hauls."

For unenclosed North Atlantic flights, S&WA increased the maximum payload of its four Lockheed transports to 17,000 lb and operated them at a local-level load factor of 53%. Direct operating cost was approximately 10 cents per ton-mile.

Despite its confidence in Super Constellation long-haul, Southeast looks at both the 1049D and the 1049H as options transports.

"Our cargo airplane will carry at least 30 tons of cargo," says Norden, "and it will have an economic and competitive cargo rates that will be competitive with big freighters."

"Cargo doors on the Super Constellation are too high. It takes an hour to load seven tons on the 1049D. As payloads get bigger, that ground time will kill us." A freighter like the Super Constellation with a 30-ton payload would take more than seven hours to load.



Tiptanks Give Turboprop YC-121F 4,000-Mi. Range

An Fairchild turboprop YC-121F, whose 198 mph speed is limited in world's fastest for a propeller aircraft, has a range of 4,000 mi with 500-lb fuel tanks shown in the flight deck. Lockheed says the combination cargo/personnel-equipment carrier can add 5 ton load across the U. S. in under 6 hr. USAF is getting two of the ships and Navy one (KC-121). Nacelles of the four 3,700-hp PW T-34 engines are mounted high on wings.

German Bilateral Is Delayed As State Studies Criticisms

Washington, D. C.—Adams and congressional critics have caused a State Department re-examination of the proposed bilateral air transport agreement recently negotiated with West Germany (AW June 20, p. 58).

State Department delayed a final decision but went on whether to sign or negotiate the agreement while the Civil Aviation Board made its analysis of the terms which would be affected. The critics had complained they had been sufficiently disappointed in the negotiations especially in reference to proposed rights for a German carrier to Latin America.

At the conclusion of a series of meetings held recently to examine the bilateral air transport and its method of negotiation, the Senate Interstate and Foreign Commerce Committee urged the Senate, State Department and CAB to re-examine the proposal before signing it.

Senate Position

CAB will advise the State Department on the economic merits of the proposal, then State will make the decision whether or not to sign it.

The Senate committee heard testimony at a series of seven five-subject CAB and the State Department before going into closed sessions to hear certain details of the negotiations which State released in detail in public hearings because of their sensitive nature.

In open session, Deputy Assistant Secretary of State Theodore V. Kaldor noted that the granting of rights beyond New York to Latin America and to Europe would be a good idea but delayed with all foreign agencies. He said that "only those who have a right to travel and need would obtain reasonable benefits."

May Cause Restrictions

In reference to airline negotiations terms, Kaldor said that the critics had emphasized the importance of obtaining the right they are now in Germany, plus rights to operate beyond German points. The European authorities to operate into Germany are held by Pan American, World Airways and Trans World Airlines unless held by KAL.

Kaldor said the committee that selected the terms of the German and other European carriers from participation in the United States South American market can only lead to the negotiation of severe restrictions on the liberal operating rights which United States carriers enjoy to and beyond Europe now enjoy. Such a course of

action would be a serious blow to the economic well-being of the United States international airline industry and to the welfare of the country.

Kaldor asserted that Henry Hellard, Assistant Secretary of State for Latin-American Affairs, disagreed with the official State Department position on the German bilateral.

Chair Clinton told the committee that on most international routes, U.S. carriers had to stop to take connecting, because London or Paris, and other European international routes, it is illegal to German carriers to Latin America.

Pan Am's Argument

In exploring the large number of points proposed for routes by American carriers in Germany, Germany and Italy until a series of local routes have made Germany establishes a more reasonable point, it is to the advantage of U.S. international carriers to serve the points indicated in the proposed bilateral agreement.

Pan American and U.S. carriers would like Germany and South America to make the commitment that the continuation of its rights to some German routes and to fly beyond that country is extremely important both to the carrier and the United States. Pan Am Vice President Russell B. Adams said that Pan Am has no objection to trading the Pan American cities—New York, Boston, Philadelphia, Chicago and other Los Angeles and San Francisco—for the points now served by Pan Am in Germany. But the carrier did object to extending "and beyond" rights for a German carrier to Latin America.

"What is the case now standing before the Civil Aviation Board?" said Adams. Pan American wanted that rights from Civil Aviation, Germany and other countries, for this dog leg operation, would have to be purchased, and that the price might be heavy. "We are now beginning to see just how heavy the price is in the case of Germany, we do not yet know what it would be in the case of Great Britain and other countries."

South Route Definitions

Pan American said the position that Germany shouldn't get routes beyond the United States that are going to be impacted closely by Fifth Freedom traffic.

On certain routes between Germany and Latin America to Mexico, for instance—New York is on the logical course. On others, the inclusion of New York makes a dog leg route. Adams

pointed out that the "Cost Cut" route would bypass Germany, and Rio de Janeiro is 6,017 miles while the route via New York is 8,674 miles.

Adams said that such a route could have to reflect premium on U.S.-Latin America traffic, since passenger traffic between Europe and Latin America would go to a more direct route.

The Pan American witness expressed the hope that the Latin American route proposed for Germany can be more sharply defined and located. He said that the United States should not pursue a single route for TWA in the great of a dog-leg route between Germany and South America in New York.

Adams also hopes that differences involved in the German negotiations will lead to development of procedures in which U.S. carriers are more clearly informed of what is going on.

Gewirtz Criticizes House Monopoly View

"Freedom of entry" is an interpretation "in which a established replaced for the original purpose of allowing personal significance" in the context of carrier rights, said Stander Gortner, executive director of the president of Air Transport Assn., declared in testimony before the House Anti-Monopoly Subcommittee. Gortner was referring to changes that a monopoly, "closed door" situation exists in the industry.

Sen. Wayne Morse (D-Ore.), Sen. Joseph O'Mahoney (D-Wyo.) and Rep. Henry Reuss (D-Wis.) previously presented in their testimony before the sub committee that Civil Aviation Board and the scheduled airlines have created barriers fixed to within a monopolistic status quo, but the critics of new routes (AW May 16, p. 112).

Apparently referring to North American, Air France, Germany and other who have seized the "freedom of entry" banner have "concerned in their own field in square out their own little competition." Calling this "a real manifestation of monopoly," he suggested that the anti-monopolistic investigations are.

"What the proponents of so-called "freedom of entry" seek is just enough "freedom of entry" to get their own created route awards, limited to the most popular traffic routes—and then, the market share behind them," Gortner said.

"The simple fact is that "freedom" does not mean "freedom" when used by the "freedom of entry" advocates."

"No one sensible advocate freedom of entry is the case the roads would seem to replace—simply, that routes could start airline service over an route at will," he said.

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Lockheed Electra First Flight—1957

Embra, Calif.—Lockheed Aircraft Corp. is planning the first flight of an turboprop Electra for October 1957. First delivery of the 414 mph medium-haul transport to American Airlines is scheduled for 1958.

Before Lockheed starts delivery on American's \$65 million order for 35 of the new aircraft (AW June 18, p. 12), three Electras will undergo simultaneous flight tests.

In a statement last week, Lockheed President Robert E. Gross and the transportation will have a top speed of about 414 mph and a cruising speed of 404 mph, a 7,000 mi range and accommodations for from 64 to 90 passengers. Performance figures are based on design proposals to power the Electra with four 5,750-lb. Allison 501 turboprop engines. But Gross said the powerplant for AA's new transport has not been finally selected.

Designers' designs of the transport indicate later versions of the Electra will be able to use turboprop engines up to 5,000 hp for improved performance. Dimensions of the medium range aircraft include a wing area of 1,280 sq ft, and 5.3 aspect ratio.

Lockheed has set up a production rate of 12 planes per month during the first part of 1959. Gross and manufacturing personnel on the Electra series should increase mostly to a total work force of 5,000 by the end of 1958.

Pearson is Elected ATA President

Washington, D.C.—Harold L. (Pete) Pearson, Jr., was elected president of the Air Transport Assn. last week (AW May 8, p. 11).

Pearson, serving as assistant director of the Bureau of the Budget, Russian aviation has been director July 1. He becomes the fourth president of 17-year-old association of the nation's scheduled airlines. He is succeeding Earl D. Johnson who resigned after serving a 10-year term. Pearson is also president of General Dynamics, a vice president of Convair.

Pearson previously served as Deputy Under Secretary of the Army with responsibility for logistics and financial management until Earl Johnson, outgoing president.

A native of Kansas City, Mo., Pearson's business career has been in the field of advertising and financial management prior to entering government service in 1950. In addition to work with T. C. Penney and Sonnen Books, he was associated with Midwest Paper Works from 1953 until 1954 and was vice president and treasurer from 1954.

Pearson told *Airline Weekly* that the industry problem a planning out his work at the Budget Bureau is preparation for beginning the ATA job on July 1. He said that has been an assignment of the chairman of his service, but added: "I hope to be there a long time. There is a machoish shared feeling that it was not a short-term assignment and yet I don't like long-term contracts."

Airlines Will Seek Balboa Agreement



HAROLD L. PEARSON

to discuss these problems. Some specific ranking will undoubtedly be required of me as a part of the all-important public relations responsibility of my first assignment," Pearson stated.

Other ATA board of directors' actions taken included the election of Robert L. Conroy, Jr., president of New York Airways, as chairman by conferring the board to 11 members approved of ATA's sound bill operating budget, and increasing the number of member carriers to 44 with the addition of Colorado Airlines, Republic Airlines and Northern Consolidated Airlines. The associate memberships of Pan American-Globe Airlines and West Alaska Airlines were changed to full memberships.

as the Balboa crew got together last week to work out necessary agreements.

The Board extended its June 20 deadline to June 30 to allow Eastern Air Lines, Braniff Airways, National Airlines, Pan American World Airways and Pan American-Globe Airlines added time to work out agreements for operation of the two proposed sub-charters.

Originally, CAB gave the carriers only 30 days to present plans for the territories. Pan American and Eastern named with a few days before June 20 before announcing they would go ahead with the National-Pan American and Eastern-Braniff interchanges the Board asked them to set up.

Both pairs of carriers were conducting negotiations last week to conclude agreements before the June 30 filing date.

While Eastern and Pan American were deciding whether or not to oppose the CAB Balboa decision, National and Pan Am worked out an agreement for the exchange and left with the Board. The agreement didn't include Pan American, over whose route Pan Am would have to operate between the Coast Zone and Miami to benefit the Coast Zone and Miami to benefit National.

Under the Pan American plan, National would take over Pan Am's aircraft at Miami on a charter basis and fly them between Miami and New York. National would operate one first class and one tourist flight each day for Pan American, with provisions for additional flights.

The through flight agreement under which Pan American flies between the Coast Zone and Miami over a Pan American route or route(s) on the approach round-trip among the carriers on an interchange and may be appealed to the Board along with the interexchange agreement.

Piedmont Aviation Wins CAB Support

Chairman of Piedmont Aviation's route network in Washington, D. C., has been recommended by Civil Aeronautics Board Examiner Robert A. Walsh.

Walsh recommended reinstatement of Piedmont's certificate in authentic service between Lockheed, Va., and Washington in Charlottesville, Va., for an experimental three-year period. He suggested that Piedmont be prohibited from operating on-theshore service between Washington and Danville, Roanoke and Norfolk, Va., and Winston-Salem and Greensboro/Danville, N. C.

The application of the City of Stone, Va., for an air service would be denied under the examiner's recommendations.



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VOLUNTEERS EVACUATE from downed aircraft as B-52



CROWDED RAFT leaves plane 315 min. after test begins



ALL 40 EVACUEES are on single raft. Other raft inflated in cabin

CAA Tests Ditching

Norfolk, Va.—Requirements for both ejection of passengers from ditched transport planes and required survival equipment were studied by Civil Aeronautics Administration during simulated ditching tests.

Four CAA evaluations, including 13 tests, placed the parts of typical transport passengers during Operation Ditch-A. Martin 504 transport, boomed with duffel bags, provided the stage setting for the study.

Crewmen recorded the times it took passengers to escape into the Gemini Caps. As Crash Division's 18-man life raft, free the raft and clear it from the "sinking" plane.

Operation Ditch is part of a continuing program by government and industry to improve emergency procedures and survival after plane boggings.



AS RAFT FLOATS AWAY from bugged Martin 504, a "survivor" is pulled aboard

Senate Boosts Subsidy Fund

Washington, D. C.—The Senate increased funds for fiscal 1958 subsidy payments \$15 million over the \$60 million approved by the House on a 24 to 24 roll call vote—despite two days' opposition debate led by Sen. Paul Nitze (D-Ala.) and directed primarily against Pan American World Airways.

The \$35 million approved by the Senate, though, is still \$3 million less than the \$65 million requested by Civil Aviation Board.

The Senate also raised the Board's full request of \$4325,000 for administrative expenses to \$40 million, and raised a spending limit on mail and telephone costs to \$100,000. This is \$225,000 more than the House proposed and \$346,000 more than CAIB's fiscal 1957 budget.

The differences between the House and Senate figures will be resolved by a joint conference committee of the two houses.

Is Congress Obligated?

Key issue in the lengthy Senate debate over the Senate's subsidy funds was whether Congress is legally obligated to appropriate money for making good on payments determined by CAIB in its annual reports of the results of the 1953 Civil Aviation Act.

Democrats maintained that Congress is not obligated to do so.

He said: "In a democracy, the appropriating body is the legislature. We can never allow an administration agency to be up the representatives of the people and control a position in advance of the congressional action providing them. It presented an opinion by James Robeson, Attorney General of the Senate, of the Law Division of the Library of Congress, to support his claim that 'The CAIB does not have the authority to obligate funds to the states without actual direction by the Congress.'

Sen. Spofford (Hawaii, D-8th), chairman of the subcommittee on CAB appropriations, pointed out that the Congress should not "strongly emphasize with the United States who have established these businesses and are operating freely on the faith of the present law and in the belief that Uncle Sam will be honest and fair and will pay the obligation due them."

He added that "if the Congress should refuse to recognize the obligation of the U. S. ultimately there would be chaos."

Hofford and Douglas said "we desire to reiterate our confidence" in CAIB or the General Accounting Office which audits CAIB accounts.

Douglas reported that the GAO has been negli-

gent in the performance of their duty to get it solely, and I stand on that."

Hofford's Rebuttal

If there is objection to subsidies or lack of confidence in the members of the Board, Hofford declared, the "proper way to proceed" is to amend the 1958 act authorizing the subsidies or to oppose the confirmation of CAIB members who it might be felt "have not been diligent in the discharge of their duties."

The Republican and 19 Democrats sided with Douglas in opposing the subsidies. The debate included the choices of three contractors: Chairman Warren Magnusson (D-Wash.) of the Commerce Committee; Chairman John Spelman (D-Ala.) of the Small Business Committee; and Chairman Harry Byrd (D-Va.) of the Finance Committee.

Sen. Mike Monroney (D-Oklahoma), chairman of the Commerce Select Committee on Aviation, voted with the 11 senators supporting Hofford on the measure.

Douglas' primary charge against PAA was that the carrier is using subsidy money to support the heavy loads of its wholly-owned subsidiary, International Hotels Corp.

CAB ORDERS

Done 9/18

GRANTED:

South Airlines' application for a temporarily six-months in precedents of air mail contracts to be issued.

Pring Tiger Line's application to perform two trans-Pacific flights between San Francisco and Tokyo pursuant to a contract with Mutual Air Transport.

Aero Francer Corp. application to perform five round-trip flights between Paris, France, and Rio de Janeiro, Brazil, pursuant to a contract with Jim Thomas.

Pring Tiger Line's application to perform one round-trip charter flight each for Wm. T. Davis, president of the American Kosher Food Importers Board, and for A. A. Goldstein, president of New York and return providing FTI doesn't charge an extra surcharge to make that one extra and make certain amounts in its rates.

Southland and Western Airlines' application to perform one round-trip charter flight between New York and Prestwick, Scotland, pursuant to an agreement with the Scotch Companys Travel Club. Jack Cull Service, Inc., its predecessor to engage in an importation of persons and property between Anchorage, Alaska, and any other point within the Territory of Alaska, and only days after final decision

on the acquisition of Alaska as new state.

United Aviation, Inc., its corporation to engage in an importation of persons and property between Anchorage and any other point within a 200 mile radius of Anchorage, Alaska, and only days after final decision on the acquisition of Alaska as new state.

Twin Otter Air Lines' application for carrying the cargo to engine coastal of Flight Enterprises, Inc., interlocking the temporary between Transoceanic Flight Enterprises, a. L. Wilson, E. W. Augs and F. J. Wilson.

American Venetian, S. A., permission to serve Alaska through the Alaska Inter- national Airport.

APPROVED:

Agreements between Pan American World Airways, Canadian Pacific Airlines and various other carriers relating to inter-carrier arrangements.

Resolution between carriers adopted by the International Air Transport Association to Amend the International Trade Terms for the Polar route.

DISCUSSED:

Canadian Air Service Ltd.'s authority to conduct an aeronautic experiment over the El Dorado Islands, Alaska, be confirmed for twenty days.

Approval of an agreement between various cargo operators in the polar region and the International Air Transport Association to standardize services between Hawaii and the Society Islands over Christmas Island.

South Pacific Air Lines' application for intercity and/or charter service be considered for its application for a certificate of convenience between Hawaii and the Society Islands over Christmas Island.

Reserve Air Lines' temporary mail rate be set at 40¢/lb. each for the period starting Aug. 21, 1958.

Permitting scheduling and rates for Skycar, Inc., Flying Tiger Line and British Air Asia for carriage of surface mail to be considered for its application involving surface mail rates for truck carriers.

Carry Air Transport, Inc.'s operating certificate be suspended until GAO has made sufficient reports by Jan. 15, 1961.

DISMISSED:

Northwest Airlines' application for a temporary waiver made to International Express, Inc., its predecessor to establish local post and mail rates for the domestic truck line routes.

Trans Caribbean Airways' application for approval of acquisition of Virgin Islands, at the request of the carrier.

Midwest Airlines' application for an air mail certificate, was applicant failed to file its due date to generate application.

Air Cargo Express' application for a certificate of public convenience and necessity since the applicant failed to file its due date to prosecute the application.

James J. McNamee's application for a certificate of public convenience and necessity since the applicant failed to file his due date to prosecute the application.

DENIED:

Notland Airlines' petition for non-intercourse in the Eastern-Central coastal area.



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EDITORIAL

The Poisonous Fog of Censorship

A rising tide of vigorous criticism from all segments of the American press and many portions of the aircraft industry is beginning to engulf the efforts of B. Karl Heissman to establish poisonous censorship in the Pentagon.

Recent editorials in the New York World Telegram and the Washington Post and Times Herald attacked the new Pentagon policy. A distinguished leader of the aircraft industry, Frederick B. Benschoter, chairman of United Aircraft Corp., commented sharply on the absurdity of present military information restrictions.

Mr. Heissman, a Bell Laboratories executive, has embarked on a government career based on promoting a policy of official censorship of mechanical, military and technical information. We have watched Mr. Heissman's Washington career closely from the time a few months ago when he joined the Commerce Department as the head of its Office of Strategic Information until his recent appointment as Deputy Assistant Secretary of Defense for Public Affairs. During this brief period we have seen his policy change from a politely expressed desire to see that useful information was made available to the American press and people to his latest audacious attempt to establish himself as the poisoner censor of the Pentagon.

Before the advent of Mr. Heissman at the Pentagon, most of the public relations problems—and there were many—concerned the exact point at which the line of military security classification should be drawn. An admittedly difficult problem separating the considered judgment of technically qualified people, it has never been solved satisfactorily.

However, Mr. Heissman ignored this genuine problem and plunged immediately into an effort to restrict the flow of unclassified information from the Pentagon. In this effort he was supported from Mr. Charles E. Wilson, the Secretary of Defense, who appointed him to the Pentagon job. Secretary Wilson already had established a policy that unclassified information should be withheld from the public if it did not make a "substantial contribution" to the Defense Department mission.

Now, Mr. Heissman has gone even further in the direction of poisonous censorship. To Secretary Wilson's "contribution" policy, he has added the criterion that information cannot be "useful, valuable or interesting" before the Defense Department will make it available to public and press. Who will be the judge of whether information is "useful, valuable, interesting or instructive" to the Defense Department, of course?

By his later policy statements, expressed in letters to L. Russell Wiggins, managing editor of the Washington Post and Times Herald and chairman of the Freedom of Information Committee of the American Society of Newspaper Editors, Mr. Heissman attempts to tell the American public what they can and should read about their national defense effort. He also is attempting

to tell every editor of an American publication what he can and should print about this vital endeavor.

No editor worth his salt will accept Mr. Heissman's latest policy on Defense Department information. Nor will the American public stand for a Pentagon bureaucrat deciding what they can or should know about one of this government's most important missions.

The world tide of how this policy was used to censor the accurate and complete story of the Russian space displays over Moscow is still high in the public mind. New absurdities ensue from the Pentagon every day.

Although every Russian in Moscow and hundreds of foreign observers had as opportunity to see the new Red Air Force jet fighters and bombers two months ago the Pentagon still will not release pictures of these aircraft to the American public.

Although pictures of the giant Martin PBM Seafarer have been officially released by the Pentagon, it is trying to keep secret the first flight of this huge plane powered by four racing turbines with long-pulsing afterburners as it speeds over Baltimore (population 1,357,873).

Although the Northrop Starfire and Bell X-1A graded warbirds have been publicized in popular airports on occasion stretching back more than a year ago and although the Air Force has officially declassified external pictures, the Pentagon is still trying to keep these pictures from the public.

Although the Pratt & Whitney J57 has been produced by the thousands, has been in widespread service for several years, and is handled by thousands of mechanics and directed and overseen by thousands more people, and although thousands of copies of its encyclopedic technical manuals have been printed and distributed by USAF and Navy, the Pentagon still treats this engine as a sacred secret.

The poisonous fog of censorship that is settling over the Pentagon at the direction of Secretary Wilson and his aide K. Karl Heissman will have serious effects on the aircraft industry if it is not checked soon. It will further retard our technical progress in aerospace development, it will complicate aircraft firms' relations with their stockholders, and it will seriously handicap American industry in the international competition.

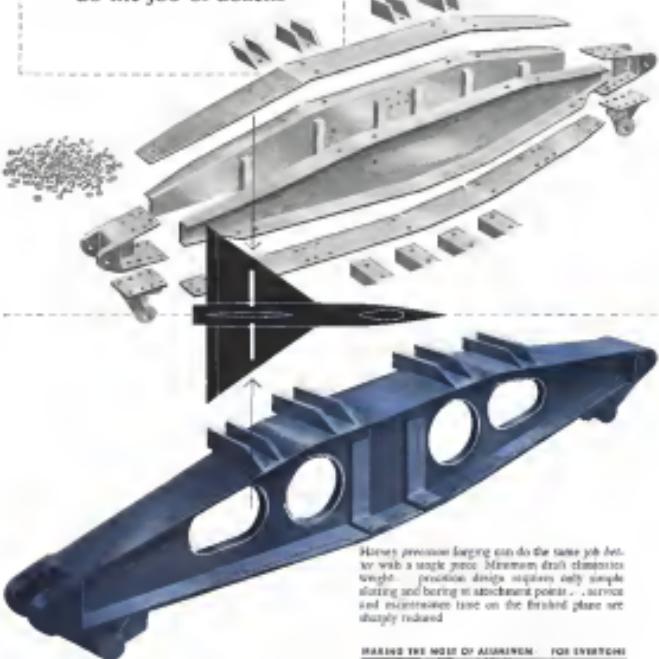
The Wilson-Heissman information policies have no place on the American scene. We agree with Managing Editor Wiggins when he told Mr. Heissman and the American press to demand a declaration that Thoreau Jefferson made in another national crisis 157 years ago:

"You fellow citizens think that they have a right to tell information in a case of such great concernment to them. It is their sweat which is to earn all the expense of the war and their blood which is to flow in expiating of the causes of it."

—Robert Hertz

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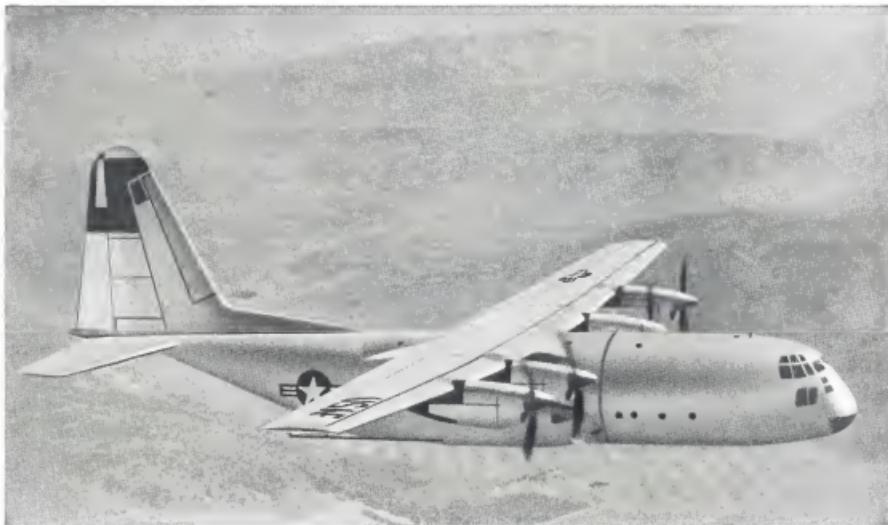
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